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ABSTRACT

The Department of Commerce created a Natural Gas Action Group early in the fall of 1975 to assist industrial firms and the communities they serve to cope with the effects of potentially severe and crippling curtailment situations. This action group was trained to assess a specific local situation, review the potential for remedial action and alternate energy sources, and to assist in the implementation of remedial action plans. This handbook was developed for use by this team in the field and has been updated for the 1976-77 season. The first four sections provide building blocks essential to the understanding of the problems encountered in the development of a strategy. They are: (1) Technical and Physical Data; (2) Governmental Organizations and Procedures; (3) Governmental and Industrial Organizations; and (4) The Gas Industry, Alternate Resources, and Industrial Resources. The last section provides a framework for assembling data and assessing and managing a curtailment. A glossary is also included. (RH)

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Staff Handbook on
NATURAL GAS

U. S. DEPARTMENT OF COMMERCE

Domestic & International Business
Administration

ACKNOWLEDGMENTS

This book is the result of the initiative of J.F. Gustaferro, the director of the Natural Gas Action Group for the winter 1975-76. He planned and organized the first training course of its kind, in which speakers from industry and government presented an overall view of the complexity of the natural gas industry and its role in the country's economy.

The substance of this volume is the quintessence of this course. Many people were consulted during the preparation of the book, far too many to mention them individually. The editors, H.A. Gorges and L.P. Raine, gratefully acknowledge their contributions and recognize that without their assistance they could not have succeeded.

Particular thanks are due to Linda Scholl of the FEA and Joe Solters of the FPC, who provided the editors with guidance and comment throughout the preparation of the manuscript.

Although care was taken to eliminate errors and inconsistencies, undoubtedly some oversights may remain in this first edition. The editors, therefore, welcome corrections and suggestions for improvements.

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Staff Handbook on
NATURAL GAS

Prepared by
Natural Gas Action Group
Office of Energy Programs
Domestic & International Business
Administration
U. S. DEPARTMENT OF COMMERCE
August 1976

UNITED STATES DEPARTMENT OF COMMERCE
Office of Energy Programs
Washington, D.C. 20230

FOREWORD

When natural gas curtailment proceeds to a point where an industrial firm, or firms, must sharply reduce operations or actually shut down, the impact on the local community--and in some cases on other firms and areas--can be severe: unemployment, direct economic loss to the firm or firms curtailed and, in some instances at least, adverse indirect or ripple effects on other firms and localities.

In some cases, there is little that can be done to mitigate these impacts. But in other cases, speedy, coordinated action can provide alternatives which avoid plant shutdowns and the adverse effects which accompany them.

To sort out the situation and to take positive remedial action calls for effective coordination of talents from many disciplines and interests. To assess the effects of a curtailment, to establish priorities of needs and to implement workable relief measures in a situation of an immediate crisis puts heavy demands on the affected community and its industry.

The Department of Commerce created a Natural Gas Action Group early in the fall of 1975 to assist industrial firms and the communities they serve to cope with the effects of potentially severe and crippling curtailment situations. This action group, designed to provide a quick reaction capability in a crisis situation, has been trained to assess quickly a specific local situation, review the potential for remedial action and alternate energy sources, and to assist in the implementation of remedial action plans which would be feasible within the provisions of government regulations and options.

The Handbook was developed for the use by this team in the field. Updated for the 1976-77 season, it is designed to contain, in concise and concentrated form, data and information for immediate use in the field. Limited copies are available for others who would find this particular approach helpful in assessing, evaluating or initiating efforts to reduce the impact of gas curtailment on a particular firm or within a given community.

Robert E. Shepherd
Director
Office of Energy Programs

savEnergy

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Introduction

The Role of the Department of Commerce in Energy

The Department of Commerce has charter responsibilities to foster trade and commerce. Recognizing the necessity of maintaining a viable industrial and commercial base to sustain the Nation's growing economy—in the face of increasing costs and diminishing energy sources, the Department is working closely with industry and business in a variety of ways to assist in the mobilizaton of the total capability of business and industry to:

- Generate and expand sources of energy supply, and in particular assure rational development of coastal energy resources.
- Use energy efficiently in the production process, improving productivity by reducing energy consumption per unit of output.
- Design and produce goods that will use energy more efficiently.*

The Office of Energy Programs (OEP), located in the Domestic and International Business Administration (DIBA), a primary operating unit of the Department,** provides the central vehicle through which many of these activities are being accomplished. Among the responsibilities assigned to OEP are the following:

- Maintaining a current overview of the main elements of energy supply and demand.
- Working with business and industry to increase their awareness of and to promote energy conservation and efficiency.
- Developing and evaluating approaches, methods, and programs to foster energy efficiency.
- Maintaining intimate liaison with key energy intensive industries and trade associations to implement energy management programs to ensure efficient use of energy resources by the business community.
- Providing technical liaison on energy matters with other Department elements, other U.S. Government agencies, and business and industry.

The Office of Energy Programs' Natural Gas Action Group (NGAG) was set up in November 1975 in anticipation of impending natural gas shortages. There were two reasons for creating the group:

> Provide a quick-reaction capability, a fire-fighting brigade, within the Department of Commerce to help ameliorate economic hardships that might be suffered in the event of natural gas curtailments during the 1975-76 season.
>
> At the same time, provide the Department and the OEP with an analytical capability that would focus on a variety of natural gas-related problems, generating information useful in decisionmaking during potential crisis periods and undertaking finely focused, quick-look studies as required.

The NGAG is to serve as an effective communication link for the exchange of experiences in solving alternate fuel and conversion problems, disseminating fuel and policy data, evaluating and promoting conservation efforts, exploring policy options, and providing State and local input to Federal policy. The effectiveness of the operation is dependent on the team's ability to move freely and expeditiously between front-line trenches and Washington.

The team, based in Washington, D.C., is made up of energy, Government, and industrial specialists, conversant with national fuel problems, Government fuel policies, relevant legislation, and industrial operations. It is backed up by the OEP staff, itself, as well as some 100 Department industry and commodity specialists, experienced in working directly with business firms and through industrial, trade, and technical associations, and can draw on any of the Commerce field representatives located throughout the United States.

The NGAG provides assistance and/or counselling by letter or telephone, in the case of simple inquiries, or by going into the field, as the need arises.

The group's operational requirements are supported by a data base, which is noncomputerized and centrally located and consists of systematically filed collections of natural gas-related materials.

These main files and this handbook, to which the files are keyed, will assist NGAG members on location to: (1) understand the local situation; (2) develop insights to the specific locale's sensitivities in allocating energy resources in the face of curtailment; (3) discuss with well-informed local managers the planning and implementation of action strategies; and (4) perform on-the-spot, quick-look assessments in an objective manner.

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*"Department of Commerce Role in National Energy Policy and Programs," n.d.

** Department of Commerce Order 10-3, "Assistant Secretay for Domestic and International Business," issued May 19, 1976.

The Role of the Handbook

Whenever a shortfall in energy occurs and endangers the economic viability of an industry or community, three tasks have to be resolved:

1. Assess the effect of the shortfall in economic terms.
2. Develop an energy management strategy for the duration of the crisis, which minimizes the adverse economic effects.
3. Implement a relief action plan which will restore "business as usual."

In many instances, a prudent management will have anticipated a crisis and will have prepared a contingency plan for the eventuality.

In any event, the nature of the problem is complex: beyond the purely technical and economic issues, it requires an up-to-date knowledge of the management, control, and regulation of resources at national and local level. No general problem-solving techniques can exist; conditions vary widely from city to city, from industry to industry, and even within an industry itself.

Wherever a gas shortage develops, a considerable amount of information will exist on the availability and distribution of resources and their economic output. This Handbook is intended to provide the necessary tools to use this information in the conduct of the three tasks described above: crisis assessment, crisis management, and relief planning.

Naturally the management of this set of tasks cannot be undertaken in a purely quantitative fashion; it requires judgment, and the assignment of priorities is going to be difficult—under the best of circumstances.

The last section of the Handbook provides a framework which will accommodate information and data available on the demand-supply situation in the state of equilibrium. A strategy can then be developed after agreement has been reached on the priorities and the progress can be continuously observed as the relief actions become effective.

It is preceded by four sections which will provide some of the building blocks essential to the understanding of the problems encountered in the development of a strategy. They are:

Section 1: Technical and physical data
Section 2: Governmental organizations and procedures
Section 3: Governmental and industrial organizations.
Section 4: The gas industry, alternate resources and industrial users.

A glossary of the terms most frequently encountered follows the main text.

Clearly, a book of this kind must be of an experimental nature. It tries to fulfill many requirements: serve as a training aid, as an address book, a technical data source, a reference to other sources of information, such as an extensive set of main files. It will require continuous updating as the demand-supply situation changes and the governmental structure with it. Essentially its present form is based on certain concepts as to how a gas shortage will manifest itself.

In order to fulfill its role, the Handbook must be tried and reviewed. It must be as dynamic as the problems to which it addresses itself.

Section 1

Purpose

This section presents some of the technical issues which are incurred in the management of energy. It addresses itself to questions such as, for example,

- Physical properties of fuels, conversion to alternate sources of energy.
- Aspects of combustion and process engineering.
- Heating requirements as a function of weather and end-use.

Contents

The data will provide inputs to the quantitative handling of the following tasks:

- Convert physical units from one system to another.
- Convert temperature, pressure and energy from the English system to the metric system.
- Convert energy from one energy form to another.
- Establish physical properties of various hydrocarbons.
- Outline processes like the usage of methane as a feedstock and coal gasification.
- A brief description of an LNG terminal.
- Determine the availability and quality of alternate fuels:
  - — propane
  - — oil
  - — coal
- Assess the cost involved in transporting energy in various forms.
- Explain the combustion mechanisms for gaseous and liquid fuels.
- Show normal seasonal heating degree day patterns across the United States.
- Establish heating requirements as a function of degree days, location and design temperature.
- A short review of environmental considerations.

Units

Multiples of Ten

Technical Usage & Prefix			U.S. Usage	European Usage
		10^{15}	Quadrillion	Billiarde
TERA	T	10^{12}	Trillion	Billion
GIGA	G	10^{9}	Billion	Milliarde
MEGA	M	10^{6}	Million	Million
KILO	K	$10^{3} = 1,000$	Thousand	
DECI	d	$10^{-1} = 1/10$		
CENTI	c	$10^{-2} = 1/100$		
MILLI	m	$10^{-3} = 1/1,000$		
MICRO	μ	$10^{-6} = 1/1,000,000$		

Thus A: 1 mg = 1/1000 grams (g)
1 kg = 1000 grams (g)
1 μg = 1/1000 mg = 10^{-6} g

Exception: Natural gas 1 Mcf = 1000 cu. ft.
1 MMcf = 1 million cu. ft.
1 Mcf = 1 million Btu

Also 1 quad = 1 quadrillion Btu
For example: U.S. Energy Demand for 1975 = 71.1 quads

Units of Measure

	U.S. System	International System
Length	In. (inch) Ft. (foot)	m
Area	Sq. In. Sq. Ft.	m^2
Volume	Cu. In. Cu. Ft.	m^3
Weight	lb. 1 (short) ton = 2000 lb.	Kg = 1,000 g
Temperature	°F (°R)	°C (°K)
Pressure	lb./sq. in.	Kg/cm^2
Specific Gravity	lb./cu. ft.	Kg/m^3
Specific Volume	cu. ft./lb.	m^3/Kg
Unit of Heat (Energy)	Btu	Kcal
Unit of Power	HP, KW, Btu/hr.	KW
Heat Content	Solid — Btu/lb. Liquid — Btu/gal. Gas — Btu/cu. ft.	Solid Kcal/Kg Liquid $Kcal/dm^3$ Gas $Kcal/m^3$

Heat (Energy): 1 Btu heats 1 lb. of water by 1°F.
1 Kcal heats 1 Kg of water by 1°C.
Power = Energy per unit of time, e.g., Btu/hr.
A standard cu. ft. (scf) refers to a gas at atmospheric pressure and 60°F.

Conversion Tables

Conversion of Thermometer Readings

Degrees Celsius to Degrees Fahrenheit

C	F	C	F	C	F	C	F	C	F	C	F
−40	−40.0	+5	+41.0	+40	+104.0	+175	+347	+350	+662	+750	+1382
−38	−36.4	6	42.8	41	105.8	180	356	355	671	800	1472
−36	−32.8	7	44.6	42	107.6	185	365	360	680	850	1562
−34	−29.2	8	46.4	43	109.4	190	374	365	689	900	1652
−32	−25.6	9	48.2	44	111.2	195	383	370	698	950	1742
−30	−22.0	10	50.0	45	113.0	200	392	375	707	1000	1832
−28	−18.4	11	51.8	46	114.8	205	401	380	716	1050	1922
−26	−14.8	12	53.6	47	116.6	210	410	385	725	1100	2012
−24	−11.2	13	55.4	48	118.4	215	419	390	734	1150	2102
−22	− 7.6	14	57.2	49	120.2	220	428	395	743	1200	2192
−20	− 4.0	15	59.0	50	122.0	225	437	400	752	1250	2282
−19	− 2.2	16	60.8	55	131.0	230	446	405	761	1300	2372
−18	− 0.4	17	62.6	60	140.0	235	455	410	770	1350	2462
−17	+ 1.4	18	64.4	65	149.0	240	464	415	779	1400	2552
−16	3.2	19	66.2	70	158.0	245	473	420	788	1450	2642
−15	5.0	20	68.0	75	167.0	250	482	425	797	1500	2732
−14	6.8	21	69.8	80	176.0	255	491	430	806	1550	2822
−13	8.6	22	71.6	85	185.0	260	500	435	815	1600	2912
−12	10.4	23	73.4	90	194.0	265	509	440	824	1650	3002
−11	12.2	24	75.2	95	203.0	270	518	445	833	1700	3092
−10	14.0	25	77.0	100	212.0	275	527	450	842	1750	3182
− 9	15.8	26	78.8	105	221.0	280	536	455	851	1800	3272
− 8	17.6	27	80.6	110	230.0	285	545	460	860	1850	3362
− 7	19.4	28	82.4	115	239.0	290	554	465	869	1900	3452
− 6	21.2	29	84.2	120	248.0	295	563	470	878	1950	3542
− 5	23.0	30	86.0	125	257.0	300	572	475	887	2000	3632
− 4	24.8	31	87.8	130	266.0	305	581	480	896	2050	3722
− 3	26.6	32	89.6	135	275.0	310	590	485	905	2100	3812
− 2	28.4	33	91.4	140	284.0	315	599	490	914	2150	3902
− 1	30.2	34	93.2	145	293.0	320	608	495	923	2200	3992
0	32.0	35	95.0	150	302.0	325	617	500	932	2250	4082
+ 1	33.8	36	96.8	155	311.0	330	626	550	1022	2300	4172
2	35.6	37	98.6	160	320.0	335	635	600	1112	2350	4262
3	37.4	38	100.4	165	329.0	340	644	650	1202	2400	4352
4	39.2	39	102.2	170	338.0	345	653	700	1292	2450	4442

TABLES OF VALUES FOR INTERPOLATION IN THE ABOVE TABLE

Degrees Celsius	1	2	3	4	5	6	7	8	9
Degrees Fahrenheit	1.8	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2

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Conversion of Pressures *

	Pounds per sq. in. to kilograms per sq. cm	Kilograms per sq. cm to pounds per sq. in.	Pounds per sq. in. to inches mercury	Pounds per sq. in. to inches water
1	0.0703	14.22	2.036	27.7
2	0.1406	28.45	4.072	55.4
3	0.2109	42.67	6.108	83.1
4	0.2812	56.89	8.144	110.8
5	0.3515	71.12	10.180	138.5
6	0.4218	85.34	12.216	166.2
7	0.4921	99.56	14.252	193.9
8	0.5625	113.8	16.288	221.6
9	0.6328	128.0	18.324	249.3

* Example: 1 lb. per sq. in. = 0.0703 kg per sq. cm

Energy Equivalents:

1 Btu = 0.252 kcal = 1.415 HP sec = 1.055 KW sec
1 Kcal = 3.968 Btu = 5.616 HP sec = 4.187 KW sec
1 KWh = 3,412 Btu = 859.9 Kcal = 1.341 HPh
1 HPh = 2,544 Btu = 641.2 Kcal = 0.7457 KWh

Power Equivalents:

1 Btu/sec = 1.055 KW = 1.415 HP
1 Kcal/sec = 5.616 HP = 4.187 KW
1 HP = 0.7068 Btu/sec
1 KW = 0.3478 Btu/sec

Density Equivalents:

1 g/cm^3 = 0.036 lb./cu. in. = 62.43 lb./cu. ft. = 8.345 lb./gal (USA)
1 lb./cu. in. = 27.68 g/cm^2 = 1728 lb./cu. ft. = 231 lb./gal
1 lb./cu. ft. = 0.016 g/cm^2 = 0.1337 lb./gal
1 lb./gal = 7.481 lb./cu. ft. = .0043 lb./cu. in. = 1198 g/cm^3

Conversion Tables

Heat Value Equivalents Derived From The Use Of British Thermal Unit Heat Values

(1) Alternate Fuel	(2) Approximate BTU Content	(3) Heat Value Equivalent of 1 Mcf of natural gas (1000 cf)
#1 and #2 Oil	139,000 per gal.	7.5 gals.
#4 Oil	150,000 per gal.	6.9 gals.
#5, #6 Bunker C and Other Residual Oils	150,000 per gal.	6.9 gals.
Propane	91,000 per gal.	11.4 gals.
LNG	54,000 per gal.	19.2 gals.
Coal	ANTHRACITE: 25,400,000 per short ton	0.041 short ton.
	BITUMINOUS: 26,200,000 per short ton	0.040 short ton.
Lignite	11,000,000 per short ton	0.094 short ton.
Electricity	10,500 per KWH	99 KWH.

Energy Unit Conversion Chart

Cubic feet natural gas (CF)	Barrels oil (Bbl)	Short tons bituminous coal (T)	British thermal units (Btu)	Kilowatt hours Electricity (KWHR)
—	—	—	1	0.000293
1	0.00018	0.00004	1000	0.293
3.41	0.00061	0.00014	3413	1
1000 (1 Mcf)	0.18	0.04	1 million	293
3413	0.61	0.14	3.41 million	1000 (1 MWhr)
5600	1	0.22	5.6 million	1640
25,000	4.46	1	25 million	7325
1 million (1 MMcf)	180	40	1 billion	293,000
3.41 million	610	140	3.41 billion	1 million (1 GWhr)
1 billion (1 bcf)	180,000	40,000	1 trillion	293 million
1 trillion (1 tcf)	180 million	40 million	1 quadrillion	293 billion

		Crude Petroleum (42 Gal. Barrel	Anthracite Coal (Short Ton)	Bituminous Coal (Short Ton)	Natural Gas - Dry (1000 cu. ft)	Distillate Fuel Oil (42 Gal. Barrel)	Residual Fuel Oil (42 Gal. Barrel)	Liquefied Pet. Gas (42 Gal. Barrel)
Crude Petroleum	42 Gal. Bbl. equals	—	0.228	0.221	5.604	0.996	0.923	1.446
Anthracite Coal	Short Ton equals	4.379	—	0.969	24.541	4.361	4.040	6.333
Bituminous Coal and Lignite	Short Ton equals	4.517	1.031	—	25.314	4.498	4.167	6.532
Natural Gas—Dry	1000 Cu. Ft. equals	0.178	0.041	0.040	—	0.178	0.165	0.258
Distillate Fuel Oil	42 Gal. Bbl. equals	1.004	0.229	0.222	5.628	—	0.927	1.452
Residual Fuel Oil	42 Gal. Bbl. equals	1.084	0.248	0.240	6.074	1.079	—	1.567
Liquefied Petroleum Gas	42 Gal. Bbl. equals	0.692	0.158	0.153	3.875	0.689	0.638	—
B.T.U. Heat Values As Used By Bureau of Mines	1000s	5,800	25,400	26,200	1,035	5,825	6,287	4,011

Other Refined Products' B.T.U. Values (1000s): Gasoline 5.248; Kerosene 5,670; Lubricants 6,064.8; Wax 5,537.3; Asphalt 6.636; Natural Gasoline 4,620 Per 42 Gallon Barrel.

COST EQUIVALENTS

If natural gas costs
1 $/Mcf then the
same amount of
energy is delivered
at the same price if
propane costs 8.8¢/gal.
oil costs .14 $/gal.
or 5.88 $/bbl.
electricity costs 1.0 mil/kwh

Properties of Light Hydrocarbons

Composition of Typical Natural Gases *

Sample No.	299	318	393	522	732	1177	1214	1225	1249	1276	1358
	Natural gas from oil or gas wells						Natural gas from pipelines				
Composition, mole percent:											
Methane	92.1	96.3	67.7	63.2	43.6	96.9	94.3	72.3	88.9	75.4	85.6
Ethane	3.8	0.1	5.6	3.1	18.3	1.7	2.1	5.9	6.3	6.4	7.8
Propane	1.0	0.0	3.1	1.7	14.2	0.3	0.4	2.7	1.8	3.6	1.4
Normal butane	0.3	0.0	1.5	0.5	8.6	0.1	0.2	0.3	0.2	1.0	0.0
Isobutane	0.3	0.0	1.2	0.4	2.3	0.0	0.0	0.2	0.1	0.6	0.1
Normal pentane	0.1	0.0	0.6	0.1	2.7	0.3	Tr	Tr	0.0	0.1	0.0
Isopentane	Tr	0.0	0.4	0.2	3.3	0.0	Tr	0.2	Tr	0.2	0.1
Cyclopentane	Tr	0.0	0.2	Tr	0.9	Tr	Tr	0.0	Tr	Tr	0.0
Hexanes plus	0.2	0.0	0.7	0.1	2.0	0.1	Tr	Tr	Tr	0.1	Tr
Nitrogen	0.9	1.0	17.4	27.9	3.0	0.6	0.0	17.8	2.2	12.0	4.7
Oxygen	0.2	0.0	Tr	0.1	0.5	Tr	Tr	Tr	Tr	Tr	Tr
Argon	Tr	Tr	0.1	0.1	Tr	0.0	0.0	Tr	0.0	Tr	Tr
Hydrogen	0.0	0.2	0.0	0.0	0.1	0.0	Tr	0.1	0.1	0.0	0.0
Carbon dioxide	1.1	2.3	0.1	0.4	0.5	0.0	2.8	0.1	0.1	0.1	0.2
Helium	Tr	Tr	1.4	2.1	Tr	Tr	Tr	0.4	0.1	0.4	0.1
Heating value†	1062	978	1044	788	1899	1041	1010	934	1071	1044	1051
Origin of sample	La.	Miss.	N. Mex.	Okla.	Tex.	W. Va.	Colo.	Kan.	Kan.	Okla.	Tex.

* Analyses from *B of M Bull.* 617 (Tr = trace).

† Calculated total (gross) Btu per cu ft, dry, at 60 F and 30 in. Hg.

Physical Properties of Light Hydrocarbons *

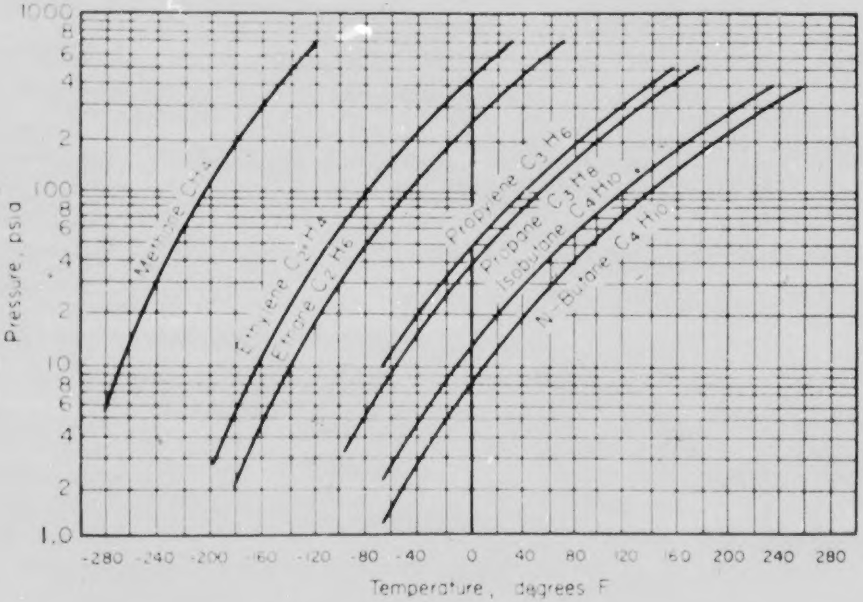
	Methane	Ethane	Propane	Isobutane	Butane	Pentane
Molecular volume of gas, cu. ft.†	378.7	375.8	372.7	366.7	365.4	
Molecular weight of gas	16.04	30.07	44.09	58.12	58.12	72.15
Gal./lb.-mole at 60°F	6.4‡	9.64	10.41	12.38	11.94	13.71
Weight:						
% carbon	74.88	79.88	81.72	82.66		
% hydrogen	25.12	20.12	18.28	17.34	17.34	
Specific gravity:						
Of liquid (water = 1)	0.248	0.377	0.508	0.563	0.584	0.631
Of liquid, °A.P.I.	340‡	247	147	120	111	93
Of gas (air = 1)	0.555	1.048	1.550	2.077	2.084	2.490
Weights and volumes:						
Lb./gal. liquid	2.5‡	3.145	4.235	4.694	4.873	5.250
Cu. ft. gas/gal. liquid	59.0‡	39.69	36.28	30.65	31.46	27.67
Cu. ft. gas/lb. liquid	24.8	12.50	8.55	6.50		
Ratio, gas volume to liquid volume§	443‡	293.4	272.7	229.3	237.8	207.0
Initial boiling point (atmospheric pressure)	−259	−128.2	−43.7	10.9	31.1	97
Heat value (gross):						
B.t.u./cu. ft. gas	1,012	1,786	2,522	3,163	3,261	4,025
B.t.u./lb. liquid	23,885	22,323	21,560	20,732	21,180	21,110
B.t.u./gal. liquid		70,210	91,500	103,750	102,600	110,800
Vapor pressure, lb./sq. in. abs.:						
At −44°F		88	0	−9	−12	−14
At 0°F		206	38	12	−7	−13
At 33°F		343	54	17	0	−11
At 70°F		563	124	45	31	−6
At 90°F		710	165	62	44	
At 100°F			189	72	52	4
At 130°F			275	110	81	11
At 150°F			346	138	87	21
Latent heat of vaporization at boiling point:						
B.t.u./lb	221	211	185	158	167	153
B.t.u./gal	553	664	785	742	808	802
Specific heat:						
Of liquid, at C_p and 60°F., B.t.u./(lb.)(°F.)		0.780	0.588	0.560	0.549	
Of gas, at C_p and 60°F., B.t.u./(lb.)(°F.)	0.526	0.413	0.390	0.406	0.396	0.402
Of gas, at C_v and 60°F., B.t.u./(lb.)(°F.)	0.402	0.347	0.346	0.373	0.363	0.376

* Johnson and Auth (eds.): "Fuels and Combustion Handbook," p. 285, McGraw-Hill, New York, 1951.

† Ideal gas = 379.5 cu. ft.

‡ Apparent values for dissolved methane at [illegible] F.

§ Based on "perfect gas."



Atmospheric Pressure

FIG. 25. Vapor pressures of pure hydrocarbons.

Examples:

(1) Natural gas (methane) at atmospheric presure liquefies at −258°F. (−161°C.).

(2) Propane at 60°F. can exist in the liquid phase at a pressure of about 115 psi absolute or 100 psi gauge.

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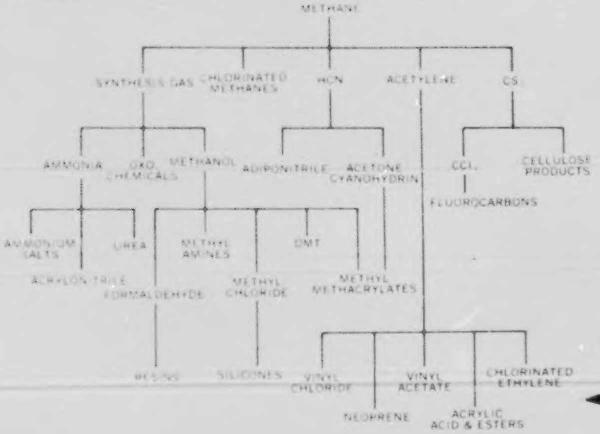
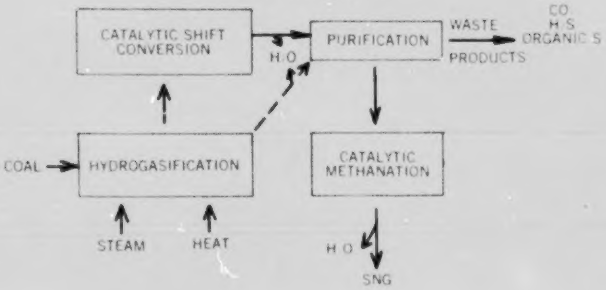
Methane Processes

1. Methane as Feedstock


METHANE
SYNTHESIS GAS
CHLORINATED METHANES
HCN
ACETYLENE
CS_2
AMMONIA
OXO CHEMICALS
METHANOL
ADIPONITRILE
ACETONE CYANOHYDRIN
CCl_4
CELLULOSE PRODUCTS
FLUOROCARBONS
AMMONIUM SALTS
UREA
METHYL AMINES
DMT
ACRYLONITRILE
FORMALDEHYDE
METHYL CHLORIDE
METHYL METHACRYLATES
RESINS
SILICONES
VINYL CHLORIDE
VINYL ACETATE
CHLORINATED ETHYLENE
NEOPRENE
ACRYLIC ACID & ESTERS

2. Methane From Coal

Coal Gasification


CATALYTIC SHIFT CONVERSION
H_2O
PURIFICATION
WASTE PRODUCTS
CO_2
H_2S
ORGANIC S
COAL
HYDROGASIFICATION
CATALYTIC METHANATION
STEAM
HEAT
H_2O
SNG

From Riegel's Handbook of Industrial Chemistry by J. Kent, © 1974 by Litton Educational Publishing, Inc. Reprinted by permission of Van Nostrand Reinhold Company.

LNG—Technology

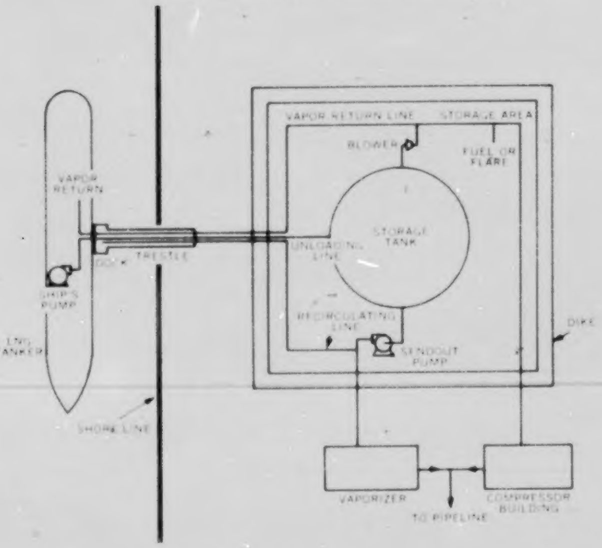
Typical capability of an LNG terminal (Cove Point, Maryland).
Liquid transfer rate ship to storage: 52,500 gpm
Storage capability: four tanks, 1,500,000 bbl. each
Vaporization rate (combustion and waste heat) 1,900 MMcft/day

LNG Properties:
Boiling point at 1 atmosphere (storage temperature) −259°F.
Liquid density at boiling point: 24.47 lb./cft.
Heat of vaporization at boiling point: 5,800 Btu/cft.
Heating value: 1,020 Btu/cft.
Gas to liquid ratio: 625 to 1

Conversion Factors for LNG (rounded for 1 MMBtu/cft.)

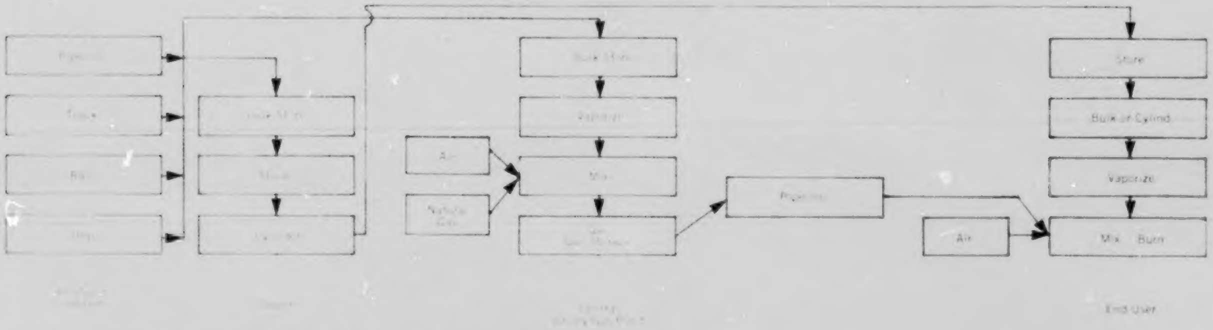
	Metric Ton Liquid	Bbl. Liquid	Gal. Liquid	Cu. Ft. Gas	Cu. Ft. Liquid	Million Btu
1 cu. ft. liquid	0.01183	0.1781	7,479	625.4	1	0.6254
1 bbl. liquid	0.0664	1	42	3,512	5.615	3,512
1 gal. liquid	0.001581	0.02381	1	83.62	0.1337	0.08362
1 cu. ft. gas x 10^6	18.91	284.8	11,960	10^6	1,599	1,000
1 million Btu	0.01891	0.2848	11.96	1,000	1,599	1

Schematic of an LNG Storage Facility


VAPOR RETURN LINE
STORAGE AREA
BLOWER
FUEL OR FLARE
VAPOR RETURN
STORAGE TANK
UNLOADING LINE
TRESTLE
DOCK
SHIP'S PUMP
RECIRCULATING LINE
DIKE
LNG TANKER
SENDOUT PUMP
SHORE LINE
VAPORIZER
TO PIPELINE
COMPRESSOR BUILDING

Alternate Fuels 1
(Propane)

A Generalized LPG System



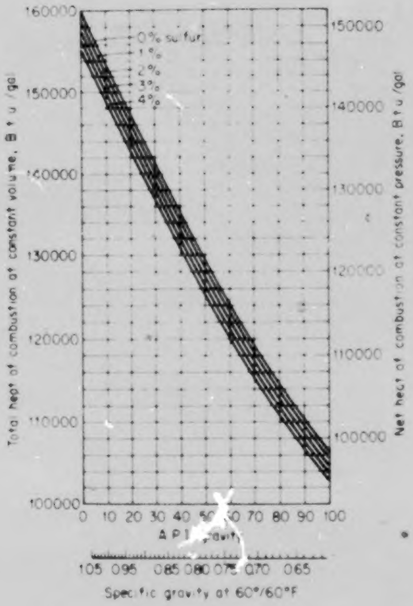
Pipeline
Truck
Rail
Ship
Bulk Store
Store
Vaporize
Air
Natural Gas
Bulk Store
Vaporize
Mix
Gas Holder
Pipeline
Store
Bulk or Cylind.
Vaporize
Air
Mix - Burn
Utility Gas Plant
End User

Pure LPG must be vaporized before mixing with air or natural gas.

Options of Introducing LPG to the End User:

Pure LPG: (1) Vaporize and mix with air at end users facility.
(2) Distribute undiluted gas from the central utility gas plant
(3) Distribute air-propane gas mixture from the central utility plant
(4) Distribute propane-methane mixture from the central utility gas plant

Vaporized LPG added to natural gas
(about 10% propane)



Alternate Fuels 2
(Liquid Fuels)

Analyses and High Heat Values of Crude Petroleum, Typical Distillates, and Fuel Oils

Product	Gravity, deg API	Specific gravity at 60 F	Wt per gal, lb	High heat value, Btu per lb	Ultimate analysis, percent				
					C	H	S	N	O
California crude	22.8	0.917	7.636	18,910	84.00	12.70	0.75	1.70	1.20
Kansas crude	22.1	0.921	7.670	19,130	84.15	13.00	1.90	0.45	
Oklahoma crude	31.3	0.869	7.236	19,502	85.70	13.11	0.40	0.30	
Oklahoma crude	31.0	0.871	7.253	19,486	85.00	12.90	0.76		
Pennsylvania crude	42.6	0.813	6.769	19,505	86.06	13.88	0.06	0.00	0.00
Texas crude	30.2	0.875	7.286	19,460	85.05	12.30	1.75	0.70	0.00
Wyoming crude	31.5	0.868	7.228	19,510					
Mexican crude	13.6	0.975	8.120	18,755	83.70	10.20	4.15		
Gasoline	67.0	0.713	5.935		84.3	15.7			
Gasoline	60.0	0.739	6.152	20,750	84.90	14.76	0.08		
Gasoline-benzene blend	46.3	0.796	6.627		88.3	11.7			
Kerosene	41.3	0.819	6.819	19,810					
Gas oil	32.5	0.863	7.186	19,200					
Fuel oil (Mex.)	11.9	0.987	8.220	18,510	84.02	10.06	4.93		
Fuel oil (mid-continent)	27.1	0.892	7.428	19,376	85.62	11.98	0.35	0.50	0.60
Fuel oil (Calif.)	16.7	0.9554	7.956	18,835	84.67	12.36	1.16		

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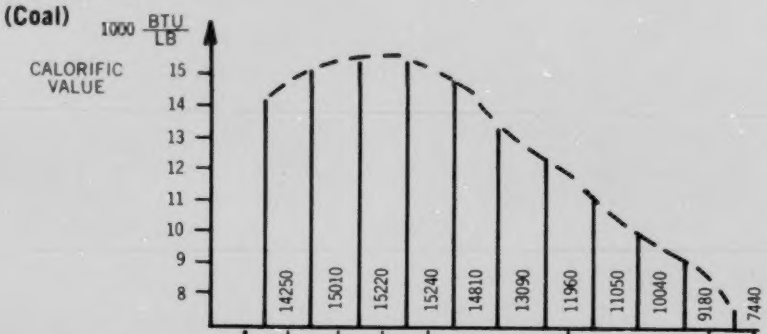
Alternate Fuels 3
(Coal)



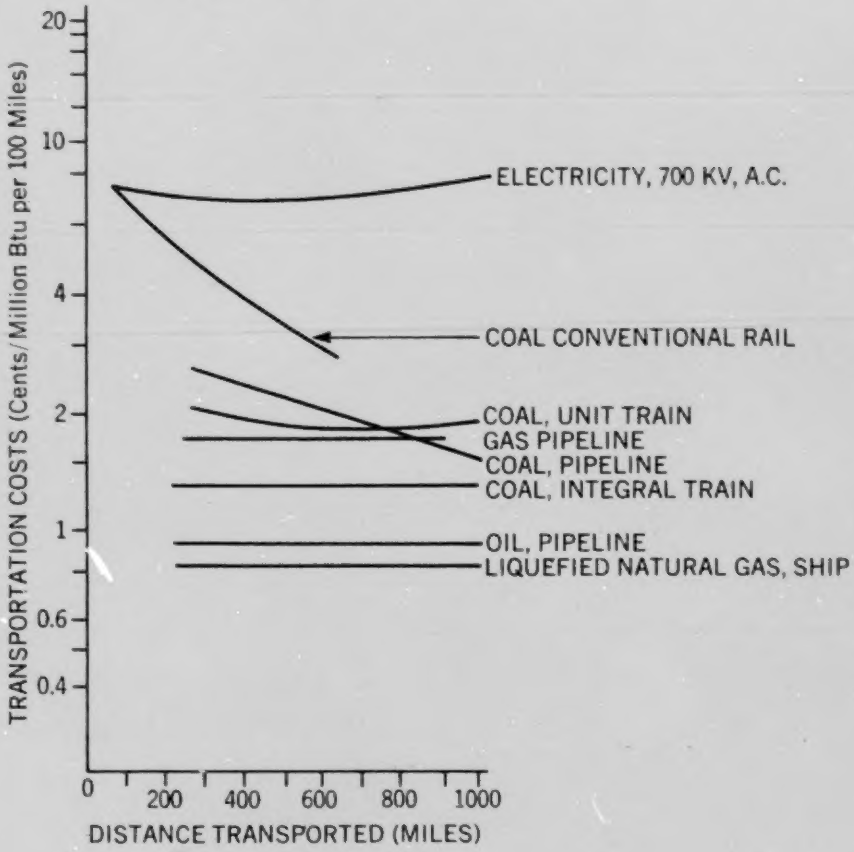
	ANTHRACITE	SEMI ANTHRACITE	LOW VOLATILE BITUMINOUS	MEDIUM VOLATILE BITUMINOUS	HIGH VOLATILE BITUMINOUS A	HIGH VOLATILE BITUMINOUS B	HIGH VOLATILE BITUMINOUS C	SUB-BITUMINOUS A	SUB-BITUMINOUS B	SUB-BITUMINOUS C	LIGNITE
ALABAMA					═	═					
ALASKA							═	═	═	═	═
ARKANSAS		═	═	═	═						
COLORADO					═	═	═	═	═	═	═
ILLINOIS					═	═	═				
INDIANA						═	═				
IOWA							═				
KANSAS					═	═					
KENTUCKY EAST					═	═					
KENTUCKY WEST					═	═	═				
MARYLAND			═	═	═						
MISSOURI							═				
MONTANA						═	═	═	═	═	═
NEW MEXICO					═	═	═		═		
NORTH DAKOTA											═
OHIO					═	═	═				
OKLAHOMA			═	═	═	═	═				
PENNSYLVANIA	═	═	═	═	═						
SOUTH DAKOTA											═
TENNESSEE				═	═						
TEXAS							═	═			═
UTAH					═	═	═	═	═		
VIRGINIA		═	═	═	═						
WASHINGTON					═	═	═		═		═
WEST VIRGINIA			═	═	═						
WYOMING						═	═	═	═	═	═

Transportation Costs

In the assessment of alternate fuels, be it on a contingency basis or in an emergency situation, transportation costs may add substantially to the costs of energy available to the end-user. Other restrictions, such as lack of trucks or rolling stock can further add to the costs of energy at the point of entry.

The following graph (excerpted from Hottel and Howard: "New Energy Technology," MIT Press, 1974) is intended to assist in the assessment of the relative costs to transport energy. The values shown here apply to large flow rates, but will serve as a useful guide, particularly in rural areas.

Costs for Energy Transportation



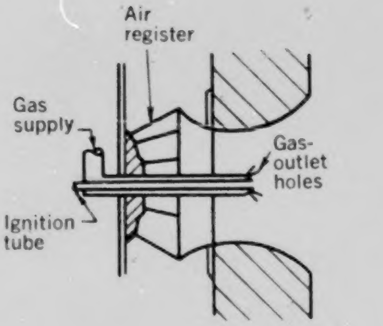
Combustion Technology

Gaseous Fuels

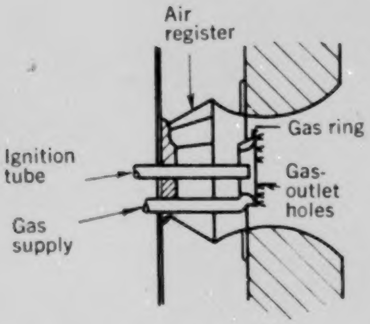
Gaseous fuels are easily dispersed or mixed with the combustion air.

Gas and air can be mixed prior to ignition; such premix burners are suitable for natural draft or forced draft application. Premix burners very often depend on a carburetor, which maintains or controls a ratio of gas to air as a function of the load. (Proportioning.)

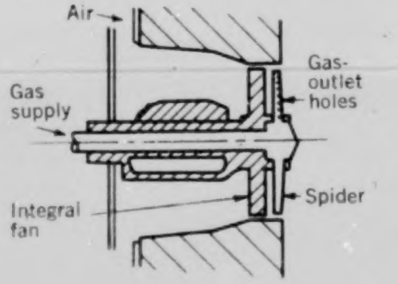
In nozzle-mix burners air and gas are combined in the combustion zone. The following figures show a few examples of nozzle-mix burners.


Air register
Gas supply
Gas-outlet holes
Ignition tube

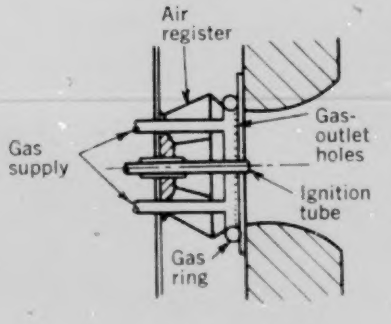
(a) Blunt Pipe


Air register
Gas ring
Ignition tube
Gas-outlet holes
Gas supply

(b) Small Ring


Air
Gas supply
Gas-outlet holes
Integral fan
Spider

(d) Turbine


Air register
Gas supply
Gas-outlet holes
Ignition tube
Gas ring

(c) Large Ring

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Liquid Fuels

Liquid fuels are vaporized or atomized in the combustion air. Provision can be made for preheating the fuel, either in the burner or some separate equipment. The following figures show a few configurations for various oil pressures, air (or steam) pressures, and fuel flow rates.

(a) Pressure type vaporizing burner (small applications only).

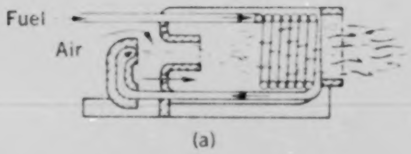
(b) High pressure steam or air atomizing burner.

(c) Horizontal rotary-cup atomizing oil burner.

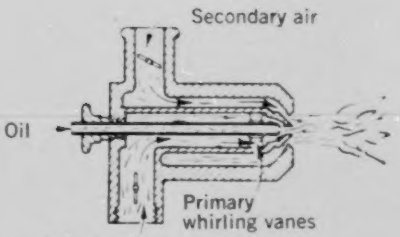
(d) Low pressure air-atomizing burner, variable pressure type.

(e) Mechanical or oil-pressure atomizing burner (return flow type).

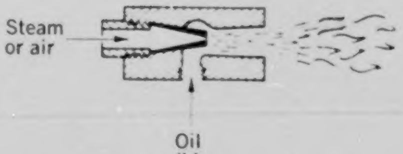
(f) Complete mechanical or oil-pressure atomizing burner unit.



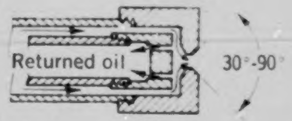
(a)



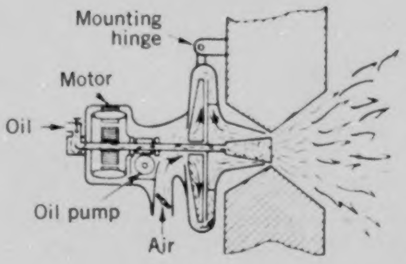
(d)



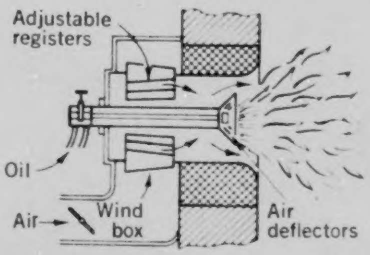
(b)



(e)



(c)



(f)

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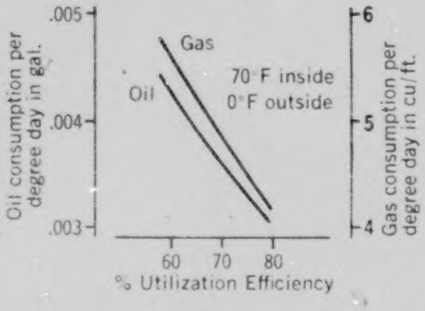
Fuel consumption per degree days for 1000 BTUh design heat loss



Relative heating requirements per degree day per unit space

Apartments (as reference)	= 1
Banks	.40 to .60
Retail Stores	.15 to .35
Hotels	.65 to .90
Office Buildings	.45 to .60

Normal Degree Days and Design Outside Temperatures

(Note—all readings are at the airport except those marked † which are in the city)
(Abstracted from *ASHRAE Guide and Data Book*)

State	City	Degree days, Sept. 1–May 31	Design outside temp, deg F	State	City	Degree days, Sept. 1–May 31	Design outside temp, deg F
Alaska	Juneau	8.088	−5	Mont.	Helena	8.250*	−39
Ala.	Birmingham	2.780	12	Nebr.	Omaha	6.160	−17
Ariz.	Phoenix	1.698	36	Nev.	Reno	6.036*	3
Ark.	Little Rock	2.982	8	N.H.	Concord	7.612*	−14
Calif.	San Francisco	3.421*	37	N.J.	Trenton†	5.068	2
Colo.	Denver	6.132*	−12	N.Mex.	Albuquerque	4.389	8
Conn.	Hartford	6.139	−2	N.Y.	New York†	5.050	5
D.C.	Washington	4.333	10	N.C.	Raleigh	3.369	14
Fla.	Jacksonville	1.243	28	N.Dak.	Bismarck	9.033*	−31
Ga.	Atlanta	2.826	11	Ohio	Cleveland	5.950	0
Hawaii	Honolulu			Okla.	Oklahoma City	3.647	−1
Idaho	Boise	5.890*	−10	Ore.	Portland	4.632*	10
Ill.	Chicago	6.310	−11	Pa.	Harrisburg	5.258	4
Ind.	Indianapolis	5.611	−8	R.I.	Providence	6.125	1
Iowa	Des Moines	6.446*	−13	S.C.	Columbia	2.435	19
Kans.	Topeka	5.209	−8	S.Dak.	Rapid City	7.535*	−22
Ky.	Louisville	4.434	−2	Tenn.	Nashville	3.513	3
La.	New Orleans	1.317	26	Tex.	Fort Worth	2.361	8
Maine	Portland	7.681*	−9	Utah	Salt Lake City	5.866	−1
Md.	Baltimore	4.787	8	Vt.	Burlington	7.865*	−17
Mass.	Boston	5.791	0	Va.	Richmond	3.955	11
Mich.	Detroit	6.404*	−4	Wash.	Spokane	6.852*	−16
Minn.	Minneapolis	7.853*	−23	W.Va.	Elkins	5.733	−4
Miss.	Vicksburg†	2.000	15	Wis.	Milwaukee	7.206*	−15
Mo.	St. Louis	4.699	−5	Wyo.	Cheyenne	7.652*	−19

* Degree days for entire year.

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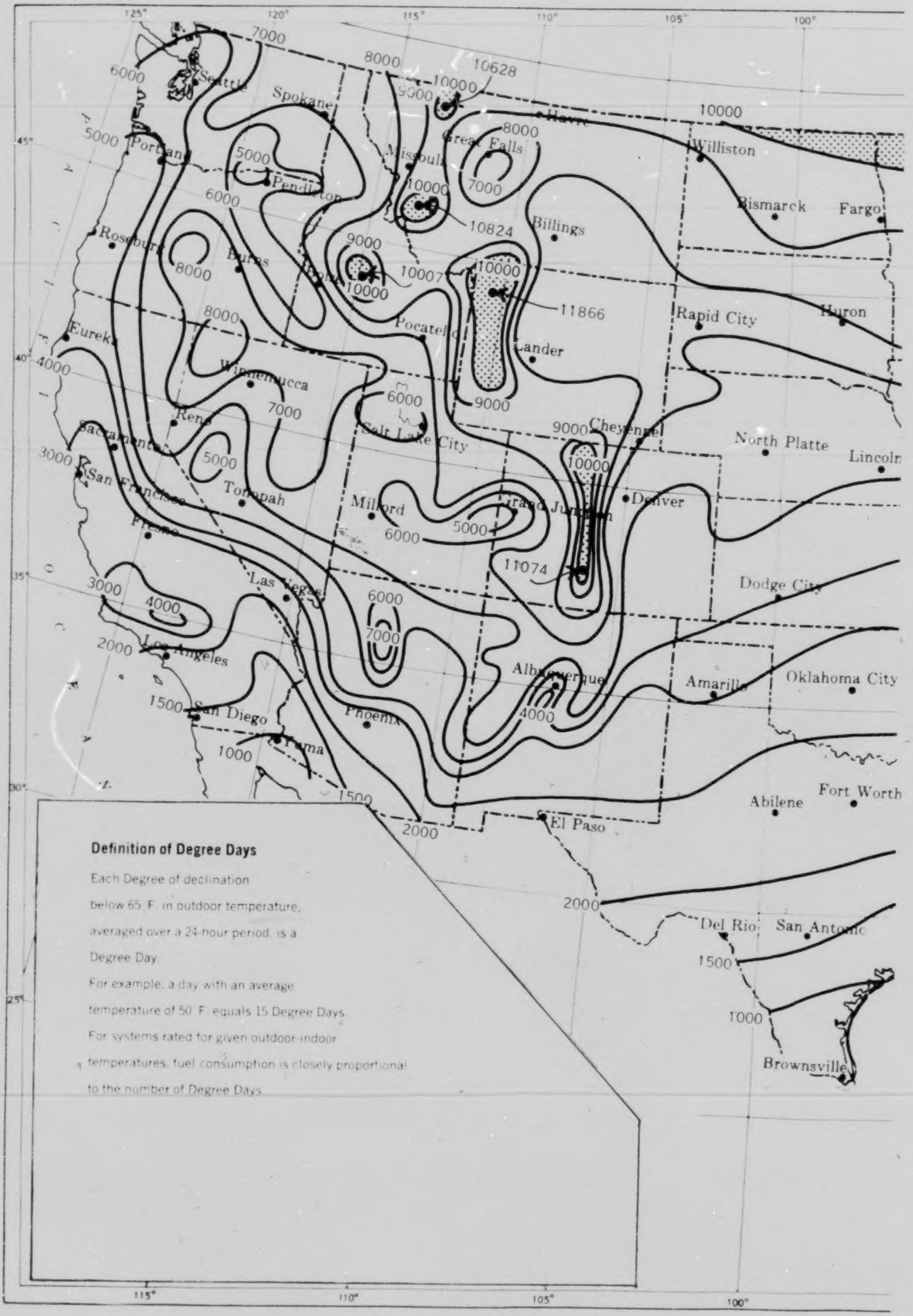
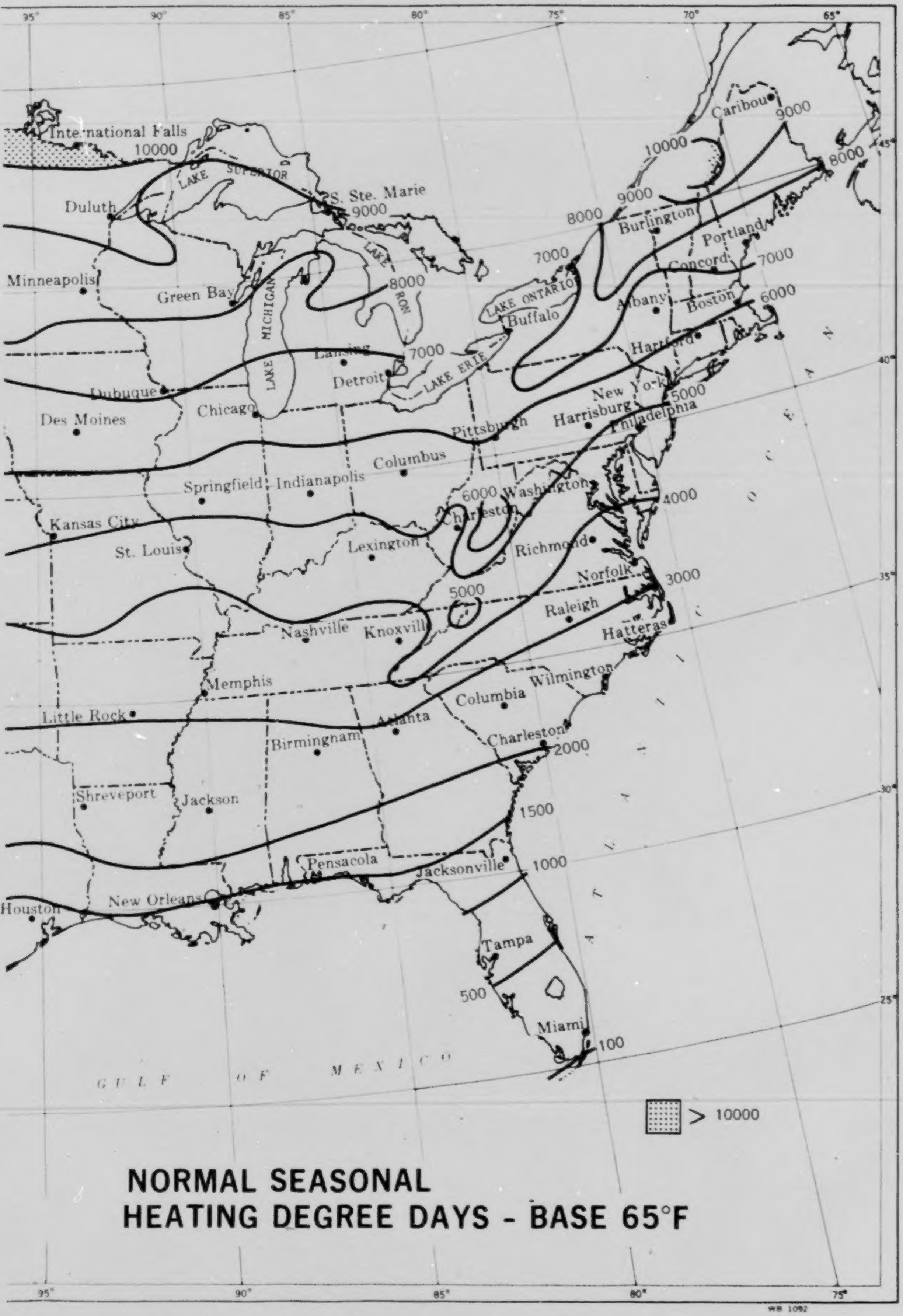

125°
120°
115°
110°
105°
100°
45°
40°
35°
30°
25°
7000
8000
10628
10000
9000
6000
Seattle
Spokane
Havre
10000
Williston
8000
Great Falls
5000
Portland
5000
Missoula
Pendleton
10000
7000
6000
Bismarck
Fargo
10824
Billings
Roseburg
8000
Burns
9000
Boise
10007
10000
10000
11866
Rapid City
Huron
8000
Pocatello
Eureka
Lander
4000
Winnemucca
7000
6000
9000
Reno
Salt Lake City
9000
Cheyenne
North Platte
Lincoln
Sacramento
5000
10000
3000
San Francisco
Tonopah
Milford
Grand Junction
Denver
6000
5000
Fresno
11074
3000
Las Vegas
Dodge City
4000
6000
7000
2000
Los Angeles
Albuquerque
Amarillo
Oklahoma City
1500
San Diego
Phoenix
4000
Yuma
1000
1500
2000
El Paso
Abilene
Fort Worth
2000
Del Rio
San Antonio
1500
1000
Brownsville
115°
110°
105°
100°

Definition of Degree Days

Each Degree of declination below 65 F. in outdoor temperature, averaged over a 24-hour period, is a Degree Day.

For example, a day with an average temperature of 50 F. equals 15 Degree Days.

For systems rated for given outdoor-indoor temperatures, fuel consumption is closely proportional to the number of Degree Days.


95°
90°
85°
80°
75°
70°
65°
45°
40°
35°
30°
25°
International Falls
10000
LAKE SUPERIOR
S. Ste. Marie
9000
Duluth
Caribou
9000
10000
8000
9000
8000
Burlington
Portland
7000
Concord
7000
Minneapolis
Green Bay
LAKE MICHIGAN
LAKE HURON
8000
LAKE ONTARIO
Buffalo
Albany
Boston
6000
Hartford
Lansing
7000
Detroit
LAKE ERIE
Dubuque
New York
5000
Des Moines
Chicago
Harrisburg
Philadelphia
Pittsburgh
Columbus
Springfield
Indianapolis
6000
Washington
4000
Kansas City
Charleston
St. Louis
Lexington
Richmond
Norfolk
3000
5000
Raleigh
Nashville
Knoxville
Hatteras
Memphis
Wilmington
Columbia
Little Rock
Atlanta
Charleston
2000
Birmingham
Shreveport
Jackson
1500
Pensacola
Jacksonville
1000
Houston
New Orleans
Tampa
500
Miami
100
ATLANTIC OCEAN
GULF OF MEXICO
▨ > 10000
WB 1092

NORMAL SEASONAL
HEATING DEGREE DAYS - BASE 65°F

Environmental Protection

The major environmental concern of the handbook user will be in the area of air quality control. As an example, emission standards may limit the utilization of specific alternate fuels available. Only a basic outline is given here. For other issues such as effluent standards, refer to the appropriate sections of CFR 40.

National Air
Quality Standards:

Primary standards provide an adequate safety margin to protect public health; secondary standards protect public welfare from unknown or anticipated effects from a pollutant.

Fossil-fueled
Steam Generators:

Since this particular emission source is the most likely one to be encountered, the emission standards are cited here as a very important example. For other industries such as Portland Cement. See CFR 40.

Pollutant	Air Quality Standards		Emission Standards for Fossil- Fueled Fired Steam Generators
	Primary	Secondary	
Sulfur Oxides (SO_2)	80 micrograms/cubic meter (.03 ppm) annual arithm. mean 365 micrograms/cubic meter (.14 ppm) maximum 24 hrs. once a year	1300 micrograms/cubic meter (.5 ppm) maximum 3 hrs. once a year	0.80 lb./million Btu derived from liquid fossil fuel 1.20 lb./million Btu derived from solid fossil fuel
Particulates	75 micrograms/cubic meter annual geom. mean 260 micrograms/cubic meter maximum 24 hrs. once a year		Max. 0.10 lb. per million Btu derived from fossil fuel 20% opacity; 40% permissible for 2 min./hour
C O	10 milligrams/cubic meter (9 ppm) maximum 8 hrs. once a year 40 milligrams/cubic meter (35 ppm) maximum 1 hr. once a year		
Petrochemical Oxidants	160 micrograms/cubic meter (0.08 ppm) maximum 1 hr. once a yr.		
Hydrocarbons	160 micrograms/cubic meter (.24 ppm) maximum 3 hrs. once a yr.		
Nitric Oxides (NO_2)	100 micrograms/cubic meter (.05 ppm) annual arithm. mean		0.20 lb./million Btu derived from gaseous fossil fuel 0.30 lb./million Btu derived from liquid fossil fuel 0.70 lb./million Btu derived from solid fossil fuel
	CFR 40; §50.1 — 11		CFR 40; §60.40 — 44

Section 2

Government Organizations and Procedures

Purpose

This section outlines the roles of the Federal Government (particularly the FPC and the FEA) and State and local governments in supplying natural gas or alternate fuels to end-users suffering from the effects of natural gas shortages. It provides the reader with an overview of those Federal agencies potentially useful in securing energy-related information and guidance, describes available FPC relief avenues for securing natural gas supplies, addresses the various procedures for acquiring alternate fuels via the FEA, and briefly discusses and displays various informal local measures for alleviating natural gas shortages.

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    Sample FEA Form No. 17 (with attachments)
2.4 Local Relief Options
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Section 2.1

Federal Agencies Involved in Natural Gas-Related Activity

There are a number of Federal agencies involved in one facet of natural gas-related activity or another to which one can go for information (see the chart "Federal Agencies Engaged in Natural Gas-Related Activity" on page 2.3). For the purpose of aiding end-users suffering curtailment difficulties, however, only three of these, the Federal Power Commission (FPC), the Federal Energy Administration (FEA), and the Department of Commerce (DOC), are of primary importance. Among the rest there are some that are more useful than others. The more relevant are listed below, along with appropriate addresses, telephone numbers, and brief descriptions (as needed).

Primary Agencies

FEDERAL POWER COMMISSION (FPC)
825 North Capital St., N.E.
Washington, D.C. 20426
(202) 386-6102

Develops and implements regulations governing the interstate functions of the natural gas and electric power industries, including licensing, economic, and other types of research, and data compilation on jurisdictional companies.

Bureau of Natural Gas
825 North Capital St., N.E.
Washington, D. C. 20426

Regulates natural gas companies, including producers and pipeline companies engaged in interstate transportation and sale of natural gas for resale; certifies construction of interstate pipeline facilities; investigates and regulates rates and other charges as established in interstate transactions; certifies liquefied natural gas importation; and maintains internal summaries of data filed by natural gas companies.

(For FPC publications and reports, consult main file.)

FEDERAL ENERGY ADMINISTRATION (FEA)
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461
(202) 393-6400

Develops and coordinates domestic and foreign policies as they relate to the management of energy resources; develops and implements programs to meet energy shortages, including fuel allocation, rationing, and surcharges; plans and promotes energy conservation programs; develops energy price regulations; prepares guidelines for the import/export of energy resources; develops policies and programs directed toward attaining national self-sufficiency; assembles, evaluates, and analyzes information on energy reserves, supply and demand, and related economic data; coordinates with State and local governments, industry, and the public on energy resources management.

Office of Conservation & Environment
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461

Prepares and implements energy conservation programs; conducts research on methods of conservation.

Office of Intergovernmental & Regional Relations
2000 M St., N.W.
Washington, D.C. 20506

Functions as liaison between the 10 regional offices and Washington and between the FEA and other energy-related Federal, State, and local agencies.

Office of Policy & Analysis
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461

Develops, coordinates, and evaluates agency policies and programs; operates the agency's energy data systems; coordinates quantitatve and economic impact analyses and energy forecasting; incorporates Office of Oil & Gas and Office of Energy Data & Analysis.

Office of Resource Development
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461

Develops and implements programs and policies to achieve national energy self-sufficiency through increased production and utilization of domestic energy sources (coal, petroleum, natural gas, and nuclear fuels); develops policies and programs to facilitate siting, licensing, and construction of domestic energy facilities.

National Energy Information Center
U.S. Post Office Bldg.
Benjamin Franklin Station
Washington, D.C. 20461

Serves as national central clearinghouse for energy information (production, imports, and supplies of petroleum, gasoline, and other petroleum products).

(For FEA publications and reports, consult main file.)

DEPARTMENT OF COMMERCE (DOC)
14th & Constitution Ave., N.W.
Washington, D.C. 20230
(202) 783-9200

Reviews impact of specific energy-related actions on business and industrial community; assists commercial/industrial enterprises to develop and implement energy conservation programs; participates in formulation of energy policies.

Bureau of the Census
14th & Constitution Ave., N.W.
Washington, D.C. 20230

Collects and disseminates statistical information pertaining to population, housing, agriculture, irrigation, drainage, construction, foreign trade, manufacturers, mineral industries, transportation and activities of oil and gas field operators, petroleum refiners, wholesale dealers, service stations, fuel dealers, and petroleum importers and exporters.

Domestic & International Business Administration
14th & Constitution Ave., N.W.
Washington, D.C. 20230

Manages DOC's domestic/international industrial, trade, investment, and related economic activities; prepares industrial mobilization readiness plans (energy conservation, supply demand, energy efficiency).

Bureau of Domestic Commerce
14th & Constitution Ave., N.W.
Washington, D.C. 20230

Collects, analyzes, maintains data on U.S. industries (production, pricing, inventories, marketing, labor, financing, taxation, and location and size of companies); disseminates information on crude petroleum and natural gas, natural gas liquids, petroleum refining, lubricating oils and greases, and coal mining.

Bureau of Economic Analysis
14th & Constitution Ave., N.W.
Washington, D.C. 20230

Studies alternative energy technologies, their current and capital account structures; compiles data on production/quantity value by type of fuel, expenditures by end use, expenditures by type of fuel and by industry for domestic and international trade.

Office of Energy Programs
14th & Constitution Ave., N.W.
Washington, D.C. 20230

Encourages and assists the business and industrial community to achieve immediate and significant energy savings and to develop a more permanent conservation ethic; serves as a department authority on energy sources and supplies, primarily oil, gas, and coal; participates in developing plans and programs to implement Project Independence; reviews the impact of specific Federal energy-related actions, including allocation, on business and industry.

Office of Industrial Mobilization
14th & Constitution Ave., N.W.
Washington, D.C. 20230

Assures adequate supply of strategic and critical materials for war-supporting activities and in case of national emergency.

National Bureau of Standards
Washington, D.C. 20234

Develops measurement methods/standards on energy, advanced conversion, fossil and synthetic fuels.

Center for Building Technology
Washington, D.C. 20234

Collects data on petroleum, petroleum products, coal, natural gas, hydropower, and nuclear energy; assists the public and other Federal agencies in obtaining documents; disseminates energy conservation information in building construction community.

Cryogenic Data Center
Boulder, Colorado 80302

Operates information service for cryogenics.

National Oceanic & Atmospheric Administration
Washington Science Center
6010 Executive Blvd.
Rockville, Maryland 20852

Generates geomagnetic, seismological, meteorological, aeronomic, and oceanographic data.

Environmental Data Service
3300 Whitehaven St., N.W.
Washington, D.C. 20235

Serves as a focal point for NOAA's technical and scientific information and activities; operates national data centers for geodetic, geomagnetic, seismological, meteorological, aeronomic, oceanographic, ocean mining and solar and wind energy data.

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22151

Serves as central repository for government-funded R&D reports; maintains a computer data base of abstracts in 37 categories, including area planning and development, atmospheric sciences, earth sciences, energy conversion, environmental pollution and control, materials sciences, propulsion and fuels, safety engineering and protection, and transportation.

(For DOC publications and reports, consult main files.)

Other Agencies

DEPARTMENT OF AGRICULTURE (USDA)
14th & Independence Ave., S.W.
Washington, D.C. 20250
(202) 655-4000

Conducts programs in research, conservation, rural development, and land management to meet U.S. energy needs; monitors food and agriculture fuels; compiles monthly estimates of gasoline and diesel fuel demand by State.

(For USDA publications and reports, consult main files.)

DEPARTMENT OF DEFENSE (DOD)
The Pentagon
Washington, D.C. 20301
(202) 545-6700

Advises on energy policy formulation and implementation; maintains programs for determining future fuel requirements, planning and implementing a conservation program, and evaluating fuel needs.

Defense Advanced Research Projects Agency
1400 Wilson Blvd.
Arlington, Virginia 22204

Conducts research in energy technology (including mission requirements, plans and operations, supply and demand, allocations, R&D, conservation and the conceptual design of a system to meet these needs).

Defense Supply Agency
Cameron Station
Alexandria, Virginia 22314

Procures bulk and packaged petroleum products and coal for military services and Federal agencies; collects data on availability of minerals for defense purposes.

Office of Installation & Logistics
The Pentagon
Washington, D.C. 20301

Provides guidance on availability of petroleum products from industry under peacetime and wartime conditions; conducts statistical studies on consumption of all forms of energy at Defense Supply Agency field activities (electric power natural gas, propane, oil, coal, gasoline, and diesel fuel).

Army Corps of Engineers
Forrestal Bldg.
1000 Independence Ave., S.W.
Washington, D.C. 20314

Designs constructs and administers Army petroleum and natural and liquefied petroleum gas storage and distribution systems.

(For DOD and relevant service-generated publications and reports, see main files.)

ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION (ERDA)
Washington, D.C.
(202) 376-4000

Exercises central responsibility for policy planning, coordination, support, and management of R&D for all energy sources and utilization technologies; encourages and conducts research, development, and demonstration for the extraction, conversion, storage, transmission, and utilization phases; engages in supporting environmental, biomedical, physical, and safety research; conducts conservation R&D programs, including automotive power systems, end-use consumption technologies, and improving energy efficiency.

(For ERDA reports and publications, consult main files.)

ENVIRONMENTAL PROTECTION AGENCY (EPA)
401 M St., S.W.
Washington, D.C. 20460
(202) 755-2673

Seeks to minimize environmental impact of energy production and consumption by integration of a variety of research, monitoring, standard-setting, and enforcement activities (allowable air and water pollution from energy production).

FEDERAL TRADE COMMISSION (FTC)
6th & Pennsylvania Ave., N.W.
Washington, D.C. 20580
(202) 963-1110

Conducts investigations into the competitive availability of alternative energy sources, acquisitions of coal reserves by oil companies, and petroleum marketing practices (service station lease limitations, dealer coercion, vertical price fixing, and reciprocity); conducts studies relating to energy industry structure.

GENERAL SERVICES ADMINISTRATION (GSA)
18th & F Sts., N.W.
Washington, D.C. 20405
(202) 343-1100

Manages public utility services; develops efficient and economical methods of transporting fuels and supplies needed in operation of energy producing facilities; conducts energy studies to determine type and source of energy for seating and cooling new buildings.

Federal Preparedness Agency
18th & F Sts., N.W.
Washington, D.C. 20405

Develops policies and plans for civil defense preparedness; monitors the emergency availability of such resources as materials, industrial capacity, transportation, and communications.

(For GSA reports and publications, consult main files.)

DEPARTMENT OF THE INTERIOR (USDI)

18th & C Sts., N.W.
Washington, D.C. 20240

Seeks optimal development of fuel and nonfuel mineral resources; manages federally-owned energy and mineral resources in the public interest; collects, analyzes, and disseminates scientific, technical, economic data for continuing appraisal of resource availability and demand; administers programs dealing with oil shale development, geothermal energy, Northern Great Plains coal resources, and coal-fired electrical generating plants in the Four Corners area.

Office of Energy & Minerals
18th & C Sts., N.W.
Washington, D.C. 20240

Administers plans and programs for the maintenance of an adequate supply of solid fuels to meet essential civilian and military requirements under partial or full mobilization (assembles and evaluates data on materials, equipment, manpower, transportation, electric power, and other requirements).

Geological Survey
National Center
Reston, Virginia 22092

Provides continuing appraisal of mineral fuel resources; maintains program objectives for individual energy sources (coal, oil, gas, and geothermal).

Conservation Division
National Center
Reston, Virginia 22092

Supervises industry operations for exploration, development, production of oil, gas, and coal on federal land, Indian leases, outer continental shelf; obtains data submitted by lessees and permittees under operating regulations for goal, uranium, and oil shale.

Bureau of Land Management
18th & C Sts., N.W.
Washington, D.C. 20240

Issues and administers oil, gas, and oil shale mineral leases on the public domain, acquired lands, and submerged lands; processes requests for rights-of-way of petroleum and gas pipelines over the public domain and outer continental shelf; conducts supply and demand analyses to determine location, size, and timing of offshore oil and gas sales.

Office of Land Use & Water Planning
18th & C Sts., N.W.
Washington, D.C. 20240

Focuses on energy extraction, conversion, and transport issues relating to resource allocation in land use and water planning.

Bureau of Mines
18th & C Sts., N.W.
Washington, D.C. 20240

Conducts research on mining, processing and utilization of minerals and energy resources, and energy economics.

Office of Energy
18th & C Sts., N.W.
Washington, D.C. 20240

Conducts research processing and utilization of petroleum, natural gas, coal, shale oil, and helium; coordinates activities of series of national research centers and laboratories.

National Petroleum Council
1625 K St., N.W.
Washington, D.C. 20006

Performs resource analyses and projections (marine petroleum resources, petroleum storage capacity, short-term energy conservation potential, emergency preparedness for interruption of petroleum imports, and factors affecting U.S. petroleum exploration, development, and production).

(For USDI reports and publications, consult main files.)

SECURITIES & EXCHANGE COMMISSION (SEC)

500 North Capital St.
Washington, D.C. 20549
(202) 755-1200

Regulates public utility holding company systems.

SMALL BUSINESS ADMINISTRATION (SBA)

1441 L St., S.W.
Washington, D.C. 20416
(202) 382-1891

Grants loans to firms affected by the energy crisis; receives Federal funds for energy research and development; studies the impact of the energy crisis on small businesses.

DEPARTMENT OF TRANSPORTATION (DOT)

400 7th St., S.W.
Washington, D.C. 20590
(202) 426-4000

Ensures adequacy of facilities and services for fuel movement, particularly when changes occur in rate of movement or in sources of supply due to transportation strikes, seasonal energy fluctuations in demand, or disruptions in fuel supply; promotes development, collection, and dissemination of technological, economic, and other information relevant to domestic/international transportation.

National Transportation Safety Board
800 Independence Ave., S.W.
Washington, D.C. 20591

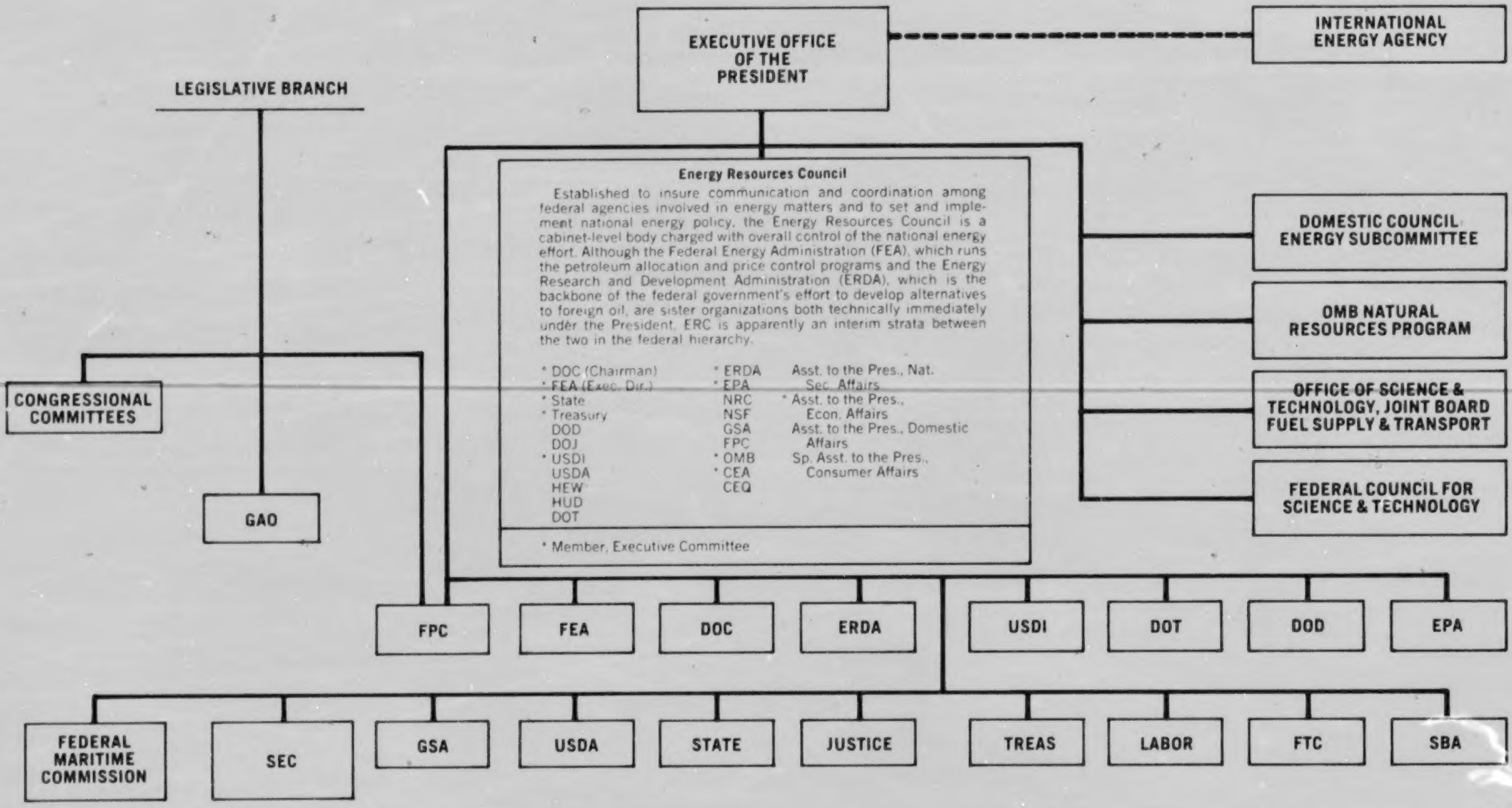
Undertakes studies on pipeline safety and petroleum or natural gas transport.

Office of Pipeline Safety
400 7th St., S.W.
Washington, D.C. 20590

Promulgates/enforces safety regulations for gas distribution systems.

(For DOT reports and publications, consult main files.)

FEDERAL AGENCIES ENGAGED IN NATURAL GAS — RELATED ACTIVITIES


EXECUTIVE OFFICE OF THE PRESIDENT
INTERNATIONAL ENERGY AGENCY
LEGISLATIVE BRANCH
CONGRESSIONAL COMMITTEES
GAO
DOMESTIC COUNCIL ENERGY SUBCOMMITTEE
OMB NATURAL RESOURCES PROGRAM
OFFICE OF SCIENCE & TECHNOLOGY, JOINT BOARD FUEL SUPPLY & TRANSPORT
FEDERAL COUNCIL FOR SCIENCE & TECHNOLOGY
FPC
FEA
DOC
ERDA
USDI
DOT
DOD
EPA
FEDERAL MARITIME COMMISSION
SEC
GSA
USDA
STATE
JUSTICE
TREAS
LABOR
FTC
SBA

Energy Resources Council

Established to insure communication and coordination among federal agencies involved in energy matters and to set and implement national energy policy, the Energy Resources Council is a cabinet-level body charged with overall control of the national energy effort. Although the Federal Energy Administration (FEA), which runs the petroleum allocation and price control programs and the Energy Research and Development Administration (ERDA), which is the backbone of the federal government's effort to develop alternatives to foreign oil, are sister organizations both technically immediately under the President, ERC is apparently an interim strata between the two in the federal hierarchy.

* DOC (Chairman)
* FEA (Exec. Dir.)
* State
* Treasury
DOD
DOJ
* USDI
USDA
HEW
HUD
DOT

* ERDA
* EPA
NRC
NSF
GSA
FPC
* OMB
* CEA
CEQ

Asst. to the Pres., Nat. Sec. Affairs
* Asst. to the Pres., Econ. Affairs
Asst. to the Pres., Domestic Affairs
Sp. Asst. to the Pres., Consumer Affairs

* Member, Executive Committee

Section 2.2

FPC Relief Options to Ameliorate Natural Gas Shortages

Curtailment Priorities

The Federal Power Commission in its General Policy Orders 467, issued January 8, 1973, and 467-B, issued March 2, 1973, set up nine "priorities-of-service" categories for policy use during periods of curtailed deliveries by pipeline companies under FPC jurisdiction. (For the complete text, see 18 CFR 2.78(c).) Listed in descending order of priority, they are as follows:

1. Residential, small commercial (less than 50 Mcf on a peak day).
2. Large commercial requirements (50 Mcf or more on a peak day), firm industrial requirements for plant protection, feedstock and process needs, and pipeline customer storage injection requirements.
3. All industrial requirements not specified in other categories listed here.
4. Firm industrial requirements for boiler use at less than 3,000 Mcf per day, but more than 1,500 Mcf per day, where alternate fuel capabilities can meet such requirements.
5. Firm industrial requirements for large volume (3,000 Mcf or more per day) boiler fuel use, where alternate fuel capabilities can meet such requirements.
6. Interruptible requirements of more than 300 Mcf per day, but less than 1,500 Mcf per day, where alternate fuel capabilities can meet such requirements.
7. Interruptible requirements of intermediate volumes (from 1,500 Mcf per day through 3,000 Mcf per day), where alternate fuel capabilities can meet such requirements.
8. Interruptible requirements of more than 3,000 Mcf per day, but less than 10,000 Mcf per day, where alternate fuel capabilities can meet such requirements.
9. Interruptible requirements of more than 10,000 Mcf per day, where alternate fuel capabilities can meet such requirements.[*]

The FPC has modified this policy statement with respect to the application of curtailment programs on each particular pipeline. Certain pipelines recently have received orders from the Commission containing modifications of 467 (Panhandle Eastern in RP 71-119, El Paso in RP 72-6, and Arkansas-Louisiana in RP 72-121). In these recent decisions the Commission has eliminated the firm/interruptible distinction with respect to contracts held by end-users; this, in turn, eliminates categories 6 through 9 as well as any references to the firm/interruptible distinctions in categories 2, 4, and 5. Among the reasons for these modifications is the growing awareness that (1) certain high priority interruptible contract holders simply need natural gas as badly as parties that have negotiated firm contracts; (2) certain companies, anticipating the application of the policy statement, switched heretofore interruptible to firm contracts; and (3) the concept, itself, of adjudicating the firm versus interruptible contract distinctions is difficult to administer because there are so many different variations of those contracts. It is important to remember, however, that these modifications apply only to wholesale deliveries between an interstate pipeline and a distributor or direct industrial consumers, those arrangements falling within FPC jurisdiction. It does not apply for resale gas to the end-user behind a distribution company, which is within the jurisdiction of the state PUC's; who for the next few years probably will continue to maintain a firm/interruptible distinction.

If state PUC's require subordination of interruptible markets as an absolute fact before curtailing firm markets, NGAG team members should advise industrial consumers on interruptible contracts on the status of the state PUC regulation at that point in time. The fact that the FPC may not make a firm/interruptible distinction in a particular pipeline case would not absolve an interruptible consumer from seeking all available self-help measures or to try to develop an alternate fuel capability.

Definitions

Each of the significant terms used in the nine "priorities-of-service" categories is defined by the FPC in 18 CFR 2.78(c).

Residential—"service to customers which consists of direct natural gas usage in a residential dwelling for space heating, air conditioning, cooking, water heating, and other residential uses."

Commercial—"service to customers engaged primarily in the sale of goods or services including institutions and local, state, and Federal Government agencies for uses other than those involving manufacturing or electric power generation."

Industrial—"service to customers engaged primarily in a process which creates or changes raw or unfinished materials into another form or product including the generation of electric power."

Firm service—"service from schedules or contracts under which seller is expressly obligated to deliver specific volumes within a given time period and which anticipates no interruptions, but which may permit unexpected interruption in case the supply to higher priority customers is threatened."

Interruptible service—"service from schedules or contracts under which seller is not expressly obligated to deliver specific volumes within a given time period, and which anticipates and permits interruption on short notice, or service under schedules or contracts which expressly or impliedly (sic) require installation of alternate fuel capability."

Plant protection gas—"minimum volumes required to prevent physical harm to the plant facilities or danger to plant personnel when such protection cannot be afforded through the use of an alternate fuel. This includes the protection of such material in process as would otherwise be destroyed, but shall not include deliveries required to maintain plant production. For the purposes of this definition, propane and other gaseous fuels shall not be considered alternate fuels."

Feedstock gas—"natural gas used as raw material for its chemical properties in creating an end product."

Process gas—"gas use for which alternate fuels are not technically feasible such as in applications requiring precise temperature controls and precise flame characteristics. For the purposes of this definition, propane and other gaseous fuels shall not be considered alternate fuels."

Boiler fuel—"considered to be natural gas used as a fuel for the generation of steam or electricity, including the utilization of gas turbines for the generation of electricity."

Alternate fuel capabilities—"a situation where an alternate fuel could have been utilized whether or not the facilities for such use have actually been installed; *provided however*, where the use of natural gas is for plant protection, feedstock, or process uses and the only alternate fuel is propane or other gaseous fuel, then the consumer will be treated as if he had no alternate fuel capability."

Pipeline Operational Flexibility

In order to provide additional natural gas to an end-user who utilizes the emergency and extraordinary relief options available under CFR 2.78 (FPC Orders 467-A and 467-C), it is necessary that pipeline companies retain operational flexibility. There are a variety of ways that a pipeline can maintain flexibility in its operational system and increase its volume of natural gas in order to be prepared to deal with these emergency demands. It behooves both NGAG team members and the end-user/consumer to be aware of these, at least in general terms.

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[*] Both direct and indirect customers that use gas for similar purposes are placed in the same category of priority. (See 2.78(a)(3).)

- A pipeline can make emergency purchases of natural gas. 18 CFR 2.68 states that it will be the general policy of the FPC to encourage *intrastate pipelines and distribution companies*, "if requested, to aid natural gas *distribution companies* and *pipeline companies* in need of temporary emergency gas supplies, by making short-term sales or deliveries of natural gas in interstate commerce for periods up to and including 60 consecutive days without any express authorization by the Federal Power Commission." (There are certain procedures that are required after 60 days, which are addressed later in the section on relief measures.)

  18 CFR contains two sections (157.22 and 157.29), which are used in a complementary fashion to expedite natural gas purchases by an *interstate pipeline* from a *producer*. 18 CFR, 157.22, *Exemption of temporary acts and operation*, stipulates that the public interest "does not require the issuance of a certificate for the . . . sale of natural gas necessary to assure maintenance of adequate natural gas service where interruption or serious curtailment of service exists or is threatened because of failure of facilities or curtailment of supply or unusual and unexpected demand on such facilities or supply, and where such acts and operations are limited to a single period of not more than 60 days. . . ." In sum, the producer does not need a certificate to sell gas to an interstate pipeline. There are, however, considerations from the producer's perspective that influence his decision to sell on an emergency gas basis.

  Some of these considerations are: future financial exposure because of the FPC and possible judicial review of the emergency pipeline sale; contract limitations on future interstate sales of gas from the source of intrastate production used for the emergency gas; whether or not the production source for the emergency gas sale has been developed under an advance payments agreement; and an intrastate producer's "fear" of becoming subject at a future date to Federal regulation by participating in an emergency sale.

  18 CFR 157.29, *Exemption of Emergency Sales or Transportation*, states that public interest "does not require the issuance of a certificate authorizing the sale or transportation of natural gas by an independent producer where imminent danger to life and property can be eliminated by such sale or transportation or where the sale or transportation of natural gas is necessary to assure maintenance of adequate natural gas service on the purchaser's pipeline system or where serious curtailment of service exists or is threatened on purchaser's system because of failure of facilities or failure or curtailment of supply or an unusual and unexpected demand on such facilities or supply, and where such sale or transportation is limited to a single period of not more than sixty (60) days." These operations terminate after 60 days unless a filing for a permanent or temporary certificate has been started within 15 days of the start of delivery. This section relaxes for short-term gas sales only the normal transportation certification procedures. However, pipelines may be reluctant to use this device because of other considerations such as possible exposure to future price refunds and payback provisions.

  A pipeline can *develop and efficiently utilize underground storage* to modify gas deliveries to consumers on a seasonal basis. Warm weather gas supplies can be stored for winter periods, and stored gas can be made available quickly for emergency uses.
- A pipeline can *curtail* all of *its customers under curtailment more deeply*—"rob Peter to pay Paul." This provides instant diversion from one customer to another.
- A pipeline can *request a voluntary relinquishment* from one or a number of customers. These customers can be on another's pipeline system, or a distributor, or even an end-user.
- A pipeline can *request voluntary conservation*. If an emergency occurs, the distributor should go to regular radio and television stations and to the newspapers and make pleas for all to lower their thermostats, etc. School hours can be cut back as well.
- A pipeline can *purchase or borrow natural gas from another pipeline*. Usually gas pipelines' supply situations and operational flexibilities will vary considerably. These variations may even change at different periods of each year depending upon underground storage capacities and load seasonality. In emergency situations, pipelines have frequently shared gas with each other either through sales or a promise to repay in kind at a later date. One potential problem which exists in sales of this type is that the FPC may, upon consideration of the transaction, disallow the full sales price charged, thereby causing the seller to lose both the gas and the full agreed upon price.
- Similar emergency exchanges of gas can be made between distribution companies and between distribution companies and pipeline companies.
- A pipeline company can raise the pressure in large sections of pipeline, thereby increasing the volume of gas "stored" in the line. This is called *"line packing."* Although this procedure would not be enough to run a big power plant for one day, for instance, pulling the line pressure down might provide enough gas to save the residences in a small town for a couple of days. A large amount of natural gas sits in a long distance pipeline system. At different points in time, a pipeline will "drawn down supplies" in the line to meet hourly shifts in demand or smaller type emergency deliveries where needed. Line packing can be used only by the pipeline itself. Each section of the system has its own line pack characteristic, pressure and volume. Although the pressure can be manipulated for a short period, the section has to be repressurized before it gets extended.
- The flexibility of a pipeline system is limited by regulations, the amount of flowing gas, existing demands (including temperature variation demands), physical limitations on the system (e.g., the pipe size and compressor facilities).

Regulations governing pipeline flexibility by the aforementioned devices are established by state PUC's as well as the Federal Power Commission using the Natural Gas Act. Both the state PUC's and the FPC are bodies to which appeals for curtailent relief may be made if the pipeline is determined to be acting in an inequitable or discriminating manner or if a case warranting special curtailment consideration is thought to exist. A grievance can be brought to the FPC by complaint of a distributor and end-user or another pipeline but requires formal procedural hearings which may be time-consuming.

Relief Mechanisms

Four relief mechanisms for obtaining natural gas are available to an end-user, suffering from curtailed supplies, *vis-a-vis* the FPC. The response time for the mechanisms described is likely to vary widely.

- **Emergency relief**, *"life and property"* standards, 18 CFR 2.78(a)(4) (FPC Order No. 467-A, issued January 15, 1973). Under this order, a pipeline company can respond immediately, and without FPC permission, to meet an emergency situation (including environmental emergencies) during curtailment periods, where supplemental deliveries of natural gas are required to forestall irreparable damage to life or property.

This supplemental gas, which is being taken from other customers, is provided only until the immediate emergency is over. The pipeline company reports to the FPC simply that it has made use of this provision. (This emergency relief provision is included in the tariffs filed by the pipeline with the FPC.)

Emergency Situations

Likelihood of loss of service to residential users, such as

- explosions due to delivery pressure drop or flame extinguishment
- health hazards and damage to the home (such as frozen or ruptured water pipes) due to temperature drop

Likelihood of loss of service to commercial users, such as

- health hazards and property damage (frozen lines) due to temperature drop and its effect on space heating

Likelihood of loss of service to essential commercial users (e.g., hospitals, nursing homes, apartment buildings—operating off a large central heating plant), such as

- explosions due to delivery pressure drop or flame extinguishment
- health hazards and property and equipment damage due to temperature drop.

Likelihood of loss of service to industrial users, such as

- health hazards and equipment damage resulting from loss of space heating (here dealing with humans and capital equipment *not* a process product)
- damage to equipment due to a shutdown
- damage to perishable agricultural products, crops, due to lack of natural gas (a crop such as alfalfa, for example, may require a dryer; the farmer, since he is often an interruptible customer needing natural gas only during a very specific phase, may be unable to procure gas)
- an electric generating power plant, which has an existing natural gas purchase contract, may need emergency natural gas because it has lost its coal-crushing machine or some other capability that may force it to have to "shed its electrical load." (Normally there are a number of contingencies available, such as buying power from another facility, but they may not be working—for whatever reason. This would have to be explained in the initial telephone conversation with the pipeline.)
- an air pollution emergency declared by a local authority because of an inversion. (If it can be shown that the introduction of additional natural gas above the curtailed volume of natural gas would produce a measurable benefit to alleviate the emergency, then the pipeline should use whatever flexibility it may have to effect additional deliveries. It is unlikely, however, that additional, pumped-in gas would make any difference. These inversions normally take place in a large metropolitan area. The amount of pollution emission (of, say, sulfur) eliminated by natural gas additions would be so small compared to the total emissions as to be negligible. In addition, the affected industry would have to be one already on a natural gas contact, who, because of curtailment, is on a dual system and temporarily using coal.)

Procedures

A *direct* customer of a pipeline, i.e., a distribution company or a direct end-user, a large direct industrial buyer, calls the pipeline saying that there is an emergency. (A third party, a customer behind a distribution company, cannot make the call to the pipeline.)

In the case of a third party, the distributor would have to demonstrate to the pipeline that it, the direct customer, had exhausted all of its internal flexibility or capability, including curtailing other customers. (If, for example, the distribution company had a needy interruptible hospital, the distributor would have to exhaust his own resources, before the pipeline would okay the relief.)

The pipeline may demand a payback either from the distributor or the direct end-user (a large industrial buyer), as soon as the emergency has passed.

It should be noted that this is a fairly new measure and has not been well-tested. There may be problems if pipeline is experiencing heavy curtailment into generally high priority markets.

- **Extraordinary relief,** *"exemptions."* 18 CFR 2.78(a)(2) (FPC Order No. 467-C, issued April 4, 1974). Under this order "extraordinary" *relief* can be applied for in those situations where the customer, the *end-user, needs relief for economic reasons*—other than damage to health and property situations; if he does not get help, he will have to shut down. The customer may need for feedstock purposes and the like, or he may be an interruptible customer behind a distributor, who has been off completely and does not have an alternate fuel capability. 18 CFR 2.78(a)(1) states that, although the "priorities-of-deliveries . . . may be applied to the deliveries of all jurisdictional pipeline companies during periods of curtailment on each company's system . . . upon a finding of extraordinary circumstances after hearing initiated by a petition . . . exceptions to those priorities may be permitted."

Extraordinary relief situations

Most of those who will feed a need to petition for an exemption to the curtailment priorities-of-deliveries schedule are industrial consumers who claim: significant production losses; unemployment; a lack of an existing alternate fuel capability; a lack of an adequate alternate fuel supply; or a non-convertible potential because of the necessity for processing a feedstock (you can refer the end-user to the definition of "process gas"); uneconomical operations due to high cost of alternate fuel compared to natural gas.

A person does have the right to file for extraordinary relief and have the petition heard on whatever basis he chooses. No regulation *precludes* him from filing on whatever economic grounds he chooses. Whether or not the FPC approves the petition is another matter. The application can be rejected if the petitioner does not qualify as an applicant or if the petition does not conform to certain procedural criteria, which will be laid out below. (See 2.78, (b)(1)-(11).)

Who can file?

- Any pipeline customer can file.
- A state commission (PUC) can file on behalf of a particular end-user served by a particular distributor, subject to PUC authority.
- An end-user behind a distributor, if joined by a distributor. (The FPC may take 10 days to begin processing an application from an end-user; if the end-user's distributor has not joined in the filing within that 10-day period, the FPC may reject the application. After one has gone through the information required to secure this type of relief, which is listed below, it becomes clear why this is so. The FPC has no jurisdiction over what the distributor does with the natural gas once it is in hand, nor can the FPC compel the end-user to use the gas in a particular way. Without the information required in the filing [2.78, (b)(11)] the FPC cannot determine whether or not the local distributor could use internal flexibility or whether or not the natural gas should be taken from other customers of the pipeline.)

Procedures for obtaining extraordinary relief

Requests for relief must contain the following information

- "The specific amount of natural gas deliveries requested on a peak day and monthly basis, and the type of contract under which the deliveries would be made."
- "The estimated duration of the relief requested."

- "A breakdown of all natural gas requirements on peak day and monthly bases at the plant site by specific end-users."
- "The specific end-uses to which the natural gas requested will be utilized and should also reflect the scheduling within each particular end-use with and without the relief requested."
- "The estimated peak day and monthly volumes of natural gas which would be available with and without the relief requested from all sources of supply for the period specified in the request."
- "A description of existing alternate fuel capabilities on peak day and monthly bases broken down by end-uses. . . ." *
- "For the alternate fuels . . . provide a description of the existing storage facilities and the amount of present fuel inventory, names and addresses of existing alternate fuel suppliers, and anticipated delivery schedules for the period for which relief is sought." *
- "The current price per million Btu for natural gas supplies and alternate fuels supplies."
- "A description of efforts to secure natural gas and alternate fuels, including documentation of contacts with the Federal Energy Office and any State or local fuel allocation agencies or public utility commission."*
- "A description of all fuel conservation activities undertaken in the facility for which relief is sought."
- "If petitioner is a local natural gas distributor, a description of the currently effective curtailment program and details regarding any flexibility which may be available by effectuating additional curtailment to its existing industrial customers. The distributor should also provide a breakdown of the estimated disposition of its natural gas estimated to be available by end-use priorities established . . . (in the "priorities-of-deliveries" scheduling) . . . for the period for which relief is sought."

Directions for preparing petitions for extraordinary relief, seeking an exemption to the priorities-of-deliveries schedule, are laid out for the applicant in 18 CFR, sections 1.7(6), 1.15, and 1.16.

Filing time The applicant should file as soon as the actual problem can be reasonably anticipated. In real time, when you can determine what the actual supply will be from the supplier with reasonable certainty, i.e., "estimated peak day and monthly volumes of natural gas . . . available with and without the relief requested, as well as the estimated duration of time relief would be necessary."

For certain types of relief, the *duration* of relief may go on indefinitely. It may continue as long as it can be demonstrated that there is a problem within the system, and the FPC finds that the relief can continue to be given without jeopardizing other customers. Relief is generally given for a sufficient period of time to allow the development of an alternate fuel capability.

Lead-time An applicant, petitioner, can ask for relief *pendente lite* (pending litigation). Whether or not the applicant will get this immediate relief while formal FPC hearings are still pending will depend upon the discretion of the FPC. Generally, the granting of immediate relief *pendente lite* is a function of, among other things, two elements: the applicant's (ultimately, the user's) *need* (this is, in turn, a function of perceived public interest at a given point in time); and the flexibility of the pipeline (how many other customers might be hurt depends on the amount the applicant wants and his priority).

If the application does not require formal hearing, the process can take as little time as one day or as long as four or five weeks, although the latter is unlikely if the end-user is threatened with an imminent shutdown.

Formal hearings may take much longer. Rebuttals must be heard from interveners in opposition, who do not want the gas taken from them for use by the applicant. (This rebuttal process is provided for under the Administrative Procedures Act [APA] and includes, in addition to rebuttal, briefs, judges' decisions, etc.) Several petitions for extraordinary relief have resulted in requests for court review of the Commission's orders granting relief.

An important thing to remember is that, in the event of a natural gas crisis, NGAG team members going into the field should stay in touch with the FPC in order to keep informed on other appeals that may be initiated on the same pipeline. They should procure week-to-week situation reports.

The level of demand being placed on a given pipeline will influence decisions by the FPC regarding an award of relief *pendente lite* and the necessity for conducting lengthy and complicated hearings. Whether or not to utilize this particular option is in large part determined by the chances for being granted relief. Certainly it would seem most advantageous to use this route in combination with other options for which the end-user would appear to qualify.

- **Self-Help,** *60-day gas*, 18 CFR 2.68 (FPC Order No. 491-D, issued March 5, 1974). This order sets up an informal relief device whereby *distribution companies* and *intrastate pipelines* are encouraged to aid *interstate natural gas distribution companies* and *pipeline companies* needing temporary emergency gas supplies for resale to an end-user. This aid can be provided by making short-term sales or deliveries of natural gas in interstate commerce up to and including 60 consecutive days, without FPC authorization.

Natural gas can be sold by an intrastate distributor to another distributor or by an intrastate pipeline company to an interstate distributor or interstate pipeline company.

It should be noted that many distribution companies that purchase additional supplies of natural gas under 2.68 from other distributors or from intrastate pipelines have a policy of not selling additional 2.68 volumes to their industrial consumers, where the gas would go for boiler fuel use or where the gas would otherwise displace existing alternate fuel capabilities controlled by these industrial end-users.

Essentially, this order permits a waiver of FPC jurisdiction over an interstate pipeline. It is up to the state PUC's to determine: how 2.68 deliveries to a distributor are to be redistributed to end-users; the price to be paid by the distributor; and the price to be paid by the end-user.

NGAG team members in the field should alert their end-users **to make sure that they are active before their PUC on these transactions.** Because the general panic associated with an energy crisis together with the lack of a bargaining position of a needy industrial end-user are conducive to price gouging, 2.68 purchases should be carefully monitored by the PUC's.

NGAG team members should also point out to the needy end-users that the **order's importance lies in the fact that although the end-user, himself, does not do the purchasing, he can contact his distributor and call his attention to this option.**

Reporting requirements:

Although the FPC plays a minimal role initially in this transaction and, in fact,

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[*] In the relief proceedings, the FPC has required applicants to show in detail in these sections how these relate to every conceivable alternate fuel, including propane and including other sources of natural gas. (If you come in for help because even though you are in category number two you have been curtailed, then you have to demonsrtate that you have looked for alternate fuels, *including propane*. Simply because you are a "process user" does not automatically qualify you. The justification is much more rigorous when you are asking that gas be diverted from another customer.)

waivers its jurisdiction over the sales rates between the intrastate sellers and the interstate buyers, there are certain requirements that must be met.

- The purchaser (an interstate pipeline company or distribution company) must file with the FPC, within 10 days after the emergency commences, "a statement in writing and under oath, together with four (4) confirmed copies thereof, briefly outlining the nature of the emergency"
- "Within 10 days after the termination of the emergency, a further sworn statement, and four (4) confirmed copies thereof, shall be filed setting forth the volume of gas delivered and indicating (1) the total reimbursement received by the seller, and (2) the applicable rate schedule, if any, or, alternatively, the bases by which the per Mcf reimbursement was derived." ("A transporter should, of course, receive adequate compensation for any additional transportation services rendered in connection with its participation in the delivery of the emergency volumes of gas and, upon termination of the emergency, shall inform the Commission, in writing, of the total amount of compensation received, if any, and the means by which the per Mcf compensation was derived." See 2.68(a).)

Requirements if emergency exceeds 60-day period

- If the emergency being responded to is expected to have a duration longer than 60 consecutive days, the purchaser has to obtain an advance statement from the FPC, prior to the end of the initial 60-day period, that the seller's status under sections 1 (b) and (c) of the Natural Gas Act won't be affected as a result of the contemplated emergency sales or deliveries. (See 2.68 (b) and 1.7 for details.)
- This same statement shall also include information on:

  the volumes of gas anticipated to be delivered during the initial 60-day period and during the extension period;

  the total anticipated compensation or reimbursement to be received, if any, and the bases by which such per Mcf price was derived.
- Within 10 days after the termination of the emergency, as extended, the purchaser or the transporting pipeline must comply wtih all the reporting requirements.

- **Direct sale,** 18 CFR 2.79 (FPC Order No. 533, issued August 28, 1975, and 533-A, issued November 25, 1975). This order allows *high-priority curtailed industrial* and *commercial end-users* to purchase natural gas directly from *producers* at prices in excess of FPC regulated rates, i.e., prevailing interstate prices. The Commission will approve appropriate requests for certificates for a period up to two years and will review requests to extend the authorization thereafter. The objective of the order is to encourage high-priority customers, threatened with curtailment, to explore the possibility of entering into *direct sales contracts* with producers and of arranging for transport of the natural gas by pipelines that are subject to FPC jurisdiction. The order is regarded essentially as a self-help mechanism, because it does not take gas from someone else on the same pipeline.

Who can file?

- Existing commercial and industrial customers whose requirements, as defined by FPC curtailment guidelines, are "large commercial requirements (50 Mcf or more on a peak day)" and "firm industrial requirements for plant protection, feedstock, and process needs." (Priority 2 uses or for those Priority 3 uses that would otherwise have been in Priority 2 had the gas been purchased on a firm basis) and who already are or will be curtailed because of curtailments by their jurisdictional pipeline supplier, when no other reasonable method of averting an emergency arises. **This order excludes direct sale by a producer to distributor for resale.**

Procedures for obtaining "direct sale" gas

The commercial or industrial end-user can contact either his distributor or pipeline supplier and tell him that he wants to find a producer, or he may attempt to locate an intrastate gas supply by dealing directly with a gas producer.

The natural gas to be acquired has got to be gas that is not already committed on an interstate contract. The gas could be that which an intrastate pipeline may give up voluntarily, because he is on a "take or pay" contractual basis with a producer and has no immediate need for all the gas he has agreed to take. Offshore natural gas in the Federal domain is not available for these direct purchases; however, the end-user can seek off-shore gas in the State domain. The distributor, pipeline company, or end-user locates some available natural gas.

The end-user then contacts the producer and they work out a *direct sales contract*, in which the price is comparable to going market prices.

A transportation agreement is worked out early on with the interstate pipeline company, because a pipeline connection to the produced will have to be arranged, or constructed. (Such construction should take only a few weeks, as the supply source should be in reasonable proximity to the interstate pipeline.) The agreed-upon price covers: cost of constructing a connector, if any are required; cost to haul the gas (transportation charge); and profit.

In addition, the pipeline company will deduct the amount of gas used as compressor fuel from his delivery by the producer. There will be, therefore, a reduced redelivery volume of some small percentage of the volume transported.

This type of transportation agreement falls within FPC's jurisdiction.

The end-user-producer gas purchase agreement, however, does not, although the FPC does consider this sales contract in determining whether or not to certificate the transportation agreement.*

The pipeline then files for a *certificate of convenience.*

Grounds for denial include, among other things not specified here, the following:

- lower priority use of the natural gas, where alternate fuels or adequate natural gas supplies are available;
- if the price of the gas is above the going field rates for intrastate contract purchases;
- if the intrastate gas would otherwise be available for sale to an interstate pipeline under an interstate contract between a pipeline and a producer, the request for a certificate would be denied. (The producer may show that the gas would be sold to other intrastate buyers. The proximity to an intrastate buyer is a factor, since the producer would likely choose to sell his gas at the higher intrastate price, rather than at today's much lower regulated interstate prices).

If the request for the certificate is approved, the arrangement goes forward. There are reporting requirements; these will be discussed in the following section.

Application for a transportation certificate must include the following information:

- The pipeline transporting the gas must:
  - indicate volumes to be transported on a peak day, average day and annual basis;
  - indicate the pipeline capacity available to perform the transport serv-

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* Although the FPC can and will apply a standard on the end-user-purchaser contract, this will be done by vetoing the whole arrangement. The FPC would tell the transporting pipeline that the arrangement is not in the public interest because the production price, for example, is too high.

ice on a peak day, average day and annual basis;

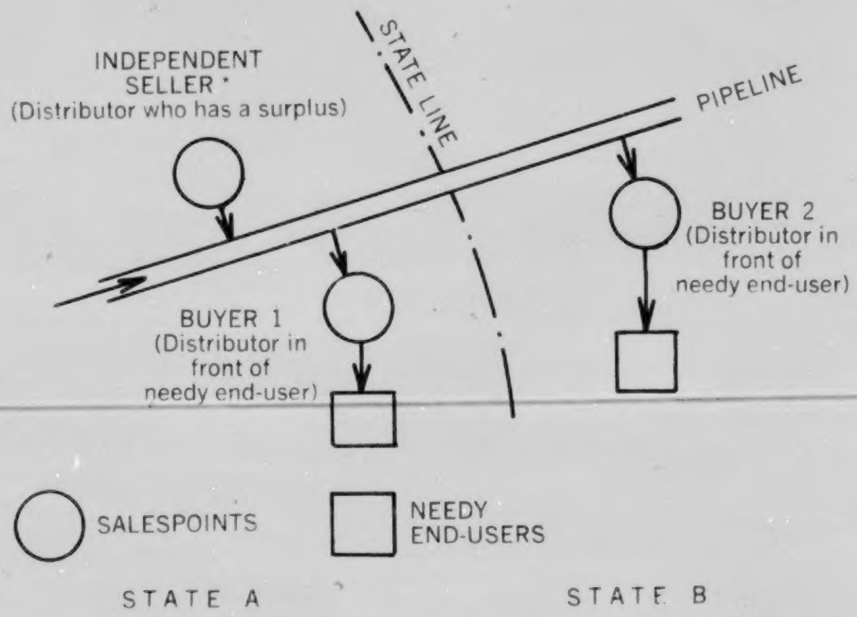
- indicate the impact of the proposed transport on the pipeline's ability to provide system-wide deliveries for Priority 1 requirements;
- provide a copy of the proposed transportation agreement, indicating the proposed transportation rate together with a breakdown and justification of the proposed rate level (include therein, a comparison of existing transportation rates for comparable services);
- provide a detailed explanation as to why the subject natural gas supply was not secured as part of the pipeline's system gas supply;
- provide an analysis as to how the gas transported will modify curtailments during the period of the proposed transport to the direct industrial consumer and/or distributor customers involved in the transaction;
- indicate the distributor's capacity to perform the transport service on a peak day, average day, and annual basis through the distribution system to the non-resale high priority industrial or commercial customer whose gas is being transported pursuant to this policy statement.

- The commercial and industrial end-user, whose gas is being transported must:
  - indicate volumes of natural gas to be purchased under proposed transport on a peak day and average day for each month of the proposed transport period;
  - indicate the proposed end-use of such consumption by end-use priorities contained in 18 CFR 2.78 (a) for each month;
  - indicate the total end-use requirements for natural gas at the plant location, where the transport gas will be used;
  - indicate the availability of other sources of natural gas at this location (specify daily contract volumes, type of contract and anticipated availability of natural gas from each source for the transport period and the end-use thereof).
  - provide a copy of the gas purchase contract with the producer underlying the proposed transport;
  - provide a detailed description of the nature of the emergency necessitating the authorization of the proposed transportation, including but not limited to the curtailment anticipated with respect to each priortiy of end-use at the plant.
- For a run-down of the reporting requirements for both the transporting pipeline company and the end-user, see 2.79 (h).

* * * *

In addition to the four options discussed above, long-range relief from FPC rulings can be attempted through intervention in FPC curtailment proceedings. An example is General Motors' continuing arguments for end-use priorities that reflect the economic value of gas to various consumers.

Also, companies and communities should consider intervening in FPC cases that more directly affect their gas supplies, such as curtailment orders for their interstate pipeline supplier and cases involving other customers of this pipeline.


INDEPENDENT SELLER *
(Distributor who has a surplus)
STATE LINE
PIPELINE
BUYER 1
(Distributor in front of needy end-user)
BUYER 2
(Distributor in front of needy end-user)
SALESPOINTS
NEEDY END-USERS
STATE A
STATE B

Case A

State A PUC approves:
  sales price set by seller (SALES POINT #1);
  sales price set by middleman-distributor in front of needy end-user (SALES POINT #2);
  actual need of end-user.
FPC approves:
  transport rate between seller and buyer #1.

Case B

State A PUC approves:
  sales price set by seller (SALES POINT #1).
State B PUC approves:
  sales price set by middleman-distributor in front of needy end-user (SALES POINT #3);
  actual need of end-user.
FPC approves:
  transport rate between seller and buyer #2.

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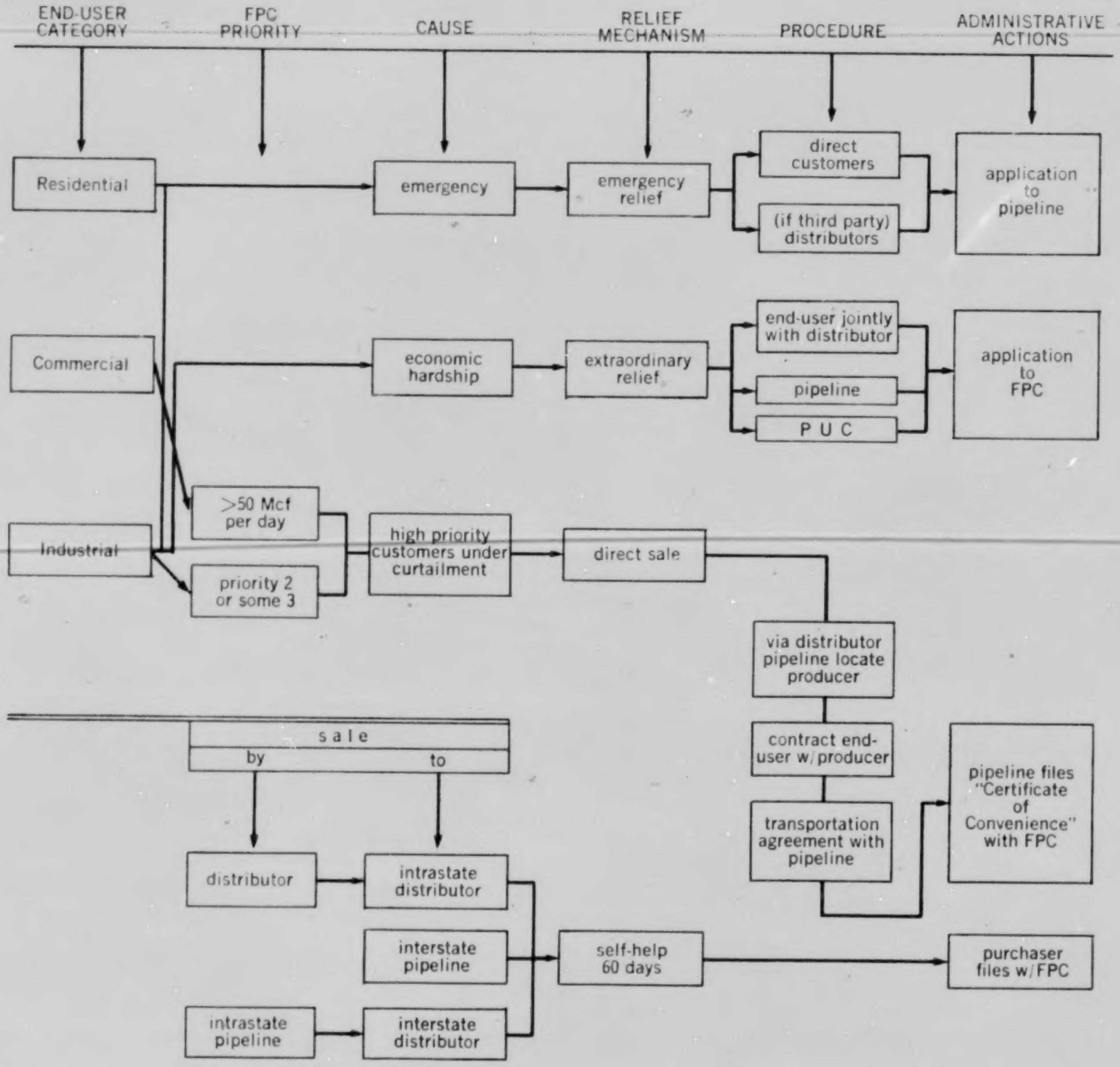
* Usually located near an interstate pipeline (the price of the natural gas to the end-user includes the cost of building the connecting pipeline, if necessary, between the independent seller and the interstate pipeline).

Guide to FPC Relief


END-USER CATEGORY
FPC PRIORITY
CAUSE
RELIEF MECHANISM
PROCEDURE
ADMINISTRATIVE ACTIONS
Residential
emergency
emergency relief
direct customers
(if third party) distributors
application to pipeline
Commercial
economic hardship
extraordinary relief
end-user jointly with distributor
pipeline
P U C
application to FPC
Industrial
>50 Mcf per day
priority 2 or some 3
high priority customers under curtailment
direct sale
via distributor pipeline locate producer
contract end-user w/producer
transportation agreement with pipeline
pipeline files "Certificate of Convenience" with FPC
sale
by
to
distributor
intrastate distributor
interstate pipeline
intrastate pipeline
interstate distributor
self-help 60 days
purchaser files w/FPC

Section 2.3

FEA Relief Options to Ameliorate Natural Gas Shortages

Alternate Fuels

The FEA has jurisdiction over the following fuels, which might be used as alternates if an end user is being deprived of natural gas:

> **Middle distillates,** "any derivatives of petroleum including kerosene, home heating oil, range oil, stove oil, and diesel fuel which have a fifty percent boiling point in the ASTM D-86 standard distillation test falling between 371° and 700° F. Products specifically excluded from this definition are kerosene-base and naphtha-base jet fuel, heavy fuel oils . . .. grades #4, #5, and #6, intermediate fuel oils (which are blends containing #6 oil), and all specialty items such as solvents, lubricants, waxes, and process oil."
>
> **Residual fuel oil,** ". . . fuel oil commonly known as: (a) #4, #5, and #6 fuel oils; (b) Bunker C; (c) Naval Special Fuel Oil; (d) crude oil when burned directly as a fuel; and all other fuel oils which have a fifty percent boiling point over 700° F. in the ASTM D-86 standard distillation test.
>
> **Propane,** "the chemical C_3H_8 in its commercial forms, including propane-butane mixes" (LPG) "in which propane constitutes greater than ten (10) percent of the mixture by weight. Included within the definition of propane is the propane content of natural gas liquids and refinery gas when used for refinery fuel use."
>
> **Butane,** "the chemical C_4H_{10} in its commercial forms, including both normal butane and iso-butane, their mixtures and mixtures of butane and propane containing ten (10) percent by weight or less of propane. Included within the definition of butane is the butane content of natural gas liquids and refinery gas when used for refinery fuel use."

Relief Vehicles

Depending on his situation, the end-user seeking an alternate fuel can avail himself of one of five vehicles provided by the FEA: adjustments, assignments, state set-aside supplies, waivers, or exceptions.

The end-user can apply for an *adjustment* of his base period volume in order to meet increased requirements for that fuel, which has been necessitated by the deprivation of natural gas. This is a particularly useful device for an "interruptible" end-user. (See 10 CFR 211.12 (h).) The applicant must be prepared to establish his historical requirements and justify his increased requirements. Applications for an adjustment to a base period volume should be made according to the steps laid out in 10 CFR 205, C. A Form No. 17 * should be filed with the regional FEA office. (An end-user filing for an adjustment is requesting a modification of his original allocation entitlement, which specifies the amount of a particular fuel he has the *right* to purchase from his supplier.)

The end-user, who chooses to acquire an alternate fuel, can apply for an *assignment*. An end-user is entitled to receive a volume of an allocated product equal to the sum of the volumes allocated to him from each of his suppliers. This is called an *entitlement*. The assignment of a base period volume provides the end-user with the right to purchase a specific amount of fuel from a supplier. He will file a Form No. 17 with his regional FEA office. (See 211.11, "Basis for Purchaser's Entitlement to Allocation," 211.12, "Purchaser's Allocation Entitlement," and 205, C, which explains the steps to be taken in order to acquire an assignment.)

An end-user experiencing difficulties in meeting his fuel requirements sufficiently severe that the situation could be reaching "hardship" or "emergency" proportions can apply to the State Petroleum Allocation Office in order to secure a temporary assignment of fuel (propane, middle distillate, motor gasoline, and residual fuel oil) from *State set-aside supplies*. The applicant must be located within that State and be able to demonstrate his hardship or emergency requirements. In addition, an end-user, who previously had no supply of that particular fuel and who is experiencing severe problems in acquiring an alternate fuel to natural gas, can apply for a new assignment from the State set-aside supply. (211.17 explains the scope and purpose of this mechanism. 205.210, Q, explains the procedures for acquiring fuel via this mechanism.) In the case of a set-aside applicant, the request may either be contained in a form (Form 20) or be conveyed verbally via the telephone. Applicants for a new assignment are required to file with the State Office the same form as used in applications for an assignment of a base period volume to regional FEA offices. In Pennsylvania, for example, the Fuel User's Emergency Line is essentially the first line of defense for curtailed gas users. Curtailed gas customers file a FUEL office application form and an FEO-17. The FEO-17 is forwarded to the regional FEA allocation officer and the FUEL office form is checked against any previous requests that may have been filed by the same consumer and verified. Fuel officials can approve or disapprove the application. If approved, a supplier is assigned and is supplied with sufficient fuels from the State set-aside to meet the consumer's requirements. If disapproved, the consumer is informed as to why such decision was made and provided with an appeal form. Appeals must be filed within 15 days of the FUEL office decision.

FUEL office allocations are for short-term emergency situations and usually have a duration of from one to six months. This allows time for the consumer to obtain supplies through regular FEA channels.

If an end-user wishes to make up for his natural gas deficiency by using additional amounts of propane (or even butane, which is highly unlikely), he can apply to the National FEA office in Washington, D.C. for a *waiver* of the limitation placed on the amount of propane or butane he is allowed to acquire. (An explanation of this special restriction on propane and butane is set out in 211.10 (g) (8).) As opposed to an entitlement, which provides the purchaser with the *right* to acquire FEA-allocated fuels, this waiver simply puts aside a flat ceiling restriction on the amount of propane or butane a purchaser is allowed to acquire. This regulation prohibits the end-user from using propane or butane in excess of the pre-determined base period amount. Again, the applicant uses FEA Form No. 17 in filing his request.

A final avenue for acquiring or increasing his alternate fuel capability, and one which ought not be pursued unless all other options are closed, is for the end-user to file for an *exception* to the regulations. (The FEA defines "exception" as a "waiver or modification of the requirements of a regulation, ruling or generally applicable requirement under a specific set of facts.") If an end-user, who has applied under some other mechanism for relief, has been denied that relief, for whatever reason, and can claim a severe hardship or gross inequity, he can file an "Application for Exception" with the Office of Exceptions and Appeals, FEA, Washington, D.C. (See 205, D.) The criteria or standards established for satisfying the contention of serious hardship or gross inequity are very rigorous, so potential applicants are encouraged to exhaust other options first. Normally, if an end-user is in desperate straits, either the FEA or the FPC will be able to help him, without his having to use this court-of-last-resort.

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* A sample FEA Form No. 17 follows on page 2.3.6, accompanied by some explanation provided by the FEA.

End-Use Categories

Which options are most appropriate in certain situations depend on the nature of end-use, e.g., industrial, commercial, residential, utilities, and emergency and medical services. The FEA defines these categories in the following manner: [*]

Industrial use, "usage by those firms primarily engaged in a process which creates or changes raw or unfinished materials into another form or product."

Commercial use, "usage by those purchasers engaged primarily in the sale of goods or services and for uses other than those involving industrial activities and electrical generation." (Here fuel is used primarily for space heating.)

Residential use, "direct usage in a residential dwelling or church or other place of worship for space heating, refrigeration, cooking, water heating, and other residential uses."

Utility, "a facility that generates electricity, by any means, and sells it to the public." (For most situations, the FEA considers a utility a commercial end-use rather than industrial.)

Emergency services, "law enforcement, fire-fighting, and emergency medical services."

Medical and nursing buildings, "buildings that house medical, dental or nursing activities, including, but not limited to . . .. the use of clinics, hospitals, nursing homes, and other facilities."

FEA Relief Options

The following options are available for acquiring particular FEA-controlled alternate fuels for a variety of specific end-uses to replace losses in natural gas. (In each case, the end-user is the applicant, not the supplier/distributor.)

- If the choice is a *middle distillate* and the end-user intends to use it for purely industrial purposes (i.e., he won't use it for space heating or as a boiler fuel), he can *go directly to his distributor* without filing an application with the FEA. (See 10 CFR 211.12(h).) If, however, he intends to use it for commercial purposes (which generally means space heating), then he must file a Form No. 17 with the FEA Regional Office, requesting an *assignment* of a supplier to provide a "base period volume." If the *commercial* end-user already has this alternate fuel capability and now needs to use it exclusively because he can no longer obtain natural gas, he will file a Form No. 17 with his FEA Regional Office in order to secure an *adjustment* of his "base period use."
- If the choice is *residual fuel oil* for either *industrial* or *commercial* (i.e., space heating) use, the end-user has to file a Form No. 17 with his FEA Regional Office in order to get an *assignment* of a supplier or an *adjustment* in his base period supplier. (See 10 CFR 211.12(h).)
- If there is a *surplus* of *middle distillates* or *residual fuel oils*, commercial and industrial end-users can acquire quantities of these from their suppliers in excess of their base period volume. (See 10 CFR 211.10(g)(f).)
- If the choice is *propane*, the end-user intends to use it for *industrial* purposes, and there is already on-site a propane capability, the end-user files an FEA Form No. 17 with the FEA Regional Office requesting an *adjustment* in his base period use. (It should be noted that in the case of industrial users, the regional FEA offices will only approve an energy-equivalent amount of propane to compensate for below base period of natural gas. Amounts in excess of that can only be secured by applying to the national office for a waiver.)

  Such end-users already have this capability *in situ*, either to handle an overload on the system, "peak shaving," or because they are interruptible natural gas customers, utilizing natural gas during various production phases. (See 211.12(h).) Apparently quite a number of industrial customers have this dual capability.

  As opposed to securing informally supplies of either middle distillates or residual fuels in excess of base period volumes, when the supplier happens to have surplus fuel on-hand, without being restricted by FEA regulations, an end-user cannot at any time procure additional supplies of propane (or butane) without applying to the FEA national office requesting a waiver of such ceiling limitations. (See 10 CFR 211.10 (g)(8).)
- If an end-user wishes to substitute *propane* for natural gas for *industrial* purposes, but lacks the facilities to utilize propane, he should submit an FEA Form No. 17, requesting an *assignment* of a supplier, to the appropriate FEA Regional Office. (See 211, D and 211.12(h).) If the end-user's gas utility has a propane utilization capability, arrangements can be made to have the propane delivered to the utility, where it will be introduced into the utility system and an equivalent amount of utility gas transmitted to the end-user via his existing natural gas line.

  It should be noted that the FEA will approve this procedure only in those cases where: the industrial end-user bears the entire cost of the product and charges for the storage, gasification, and transmission of the propane; there will be no adverse effects on the gas utility's other customers; the industrial user has no facilities for using a fuel other than pipeline gas; and this procedure is consistent with all other applicable Federal and State laws.

  The regulation further states that each user must file separately, but that a utility can take the initiative in locating a supplier.

On November 21, 1975, the FEA issued its "Guidelines for Adjustments and Assignments for Alternate Fuels," which appeared in the Federal Register, Vol. 40, No. 229, November 26, 1975. These are helpful in trying to understand the regulations, not only as they apply to propane, but to other FEA-controlled fuel allocations as well. These "Guidelines" are provided on page 2.3.18 of this handbook.

The FEA has set up the following allocation schedule for propane users: 100 percent of current requirements for agricultural production and Department of Defense use; 100 percent of current requirements (as reduced by the application of an allocation fraction) for emergency services, energy production[*], sanitation services, telecommunication services, passenger transportation services, medical and nursing buildings, aviation ground support vehicles and equipment, startup, testing and flame stability of electrical and utility plants; 100 percent of base period volumes for petrochemical feedstock use, synthetic natural gas plant feedstock use, industrial use as a process or plant protection fuel or where no substitute for propane is available, Government use, peak shaving for gas utilities[**], and refinery fuel use; 95 percent of base period use for all residential use; and [*]90 percent of base period use for commercial use (maximum of 210,000 gallons per year), standby volumes or any other industrial use, transportation services other than passenger transportation service or aviation ground vehicles, for vehicles equipped to use propane as of December 17, 1973, and schools.

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[*] 10 CFR 211.51.

[*] Energy production is defined by FEA as the "exploration, drilling, mining, refining, processing, production and distribution of coal, natural gas, geothermal energy, petroleum or petroleum products, shale oil, nuclear fuels and electrical energy. It also includes the construction of facilities and equipment used in energy production, such as pipelines, mining equipment and similar capital goods. Excluded . . . are synthetic natural gas manufacturing, electrical generation whose power source is petroleum based, gasoline blending and manufacturing and refinery fuel use." (See 10 CFR 211.51.)

[**] Propane, however, "shall not be used for peak shaving as long as the gas utility continues services during such peak shaving usage to interruptible industrial customers (other than for process fuel, plant protection fuel, or raw material) or to any non-residential customer who can use a fuel other than natural gas, propane, or butane." (See 211.84.)

If a gas utility wishes to acquire *propane* that does not exceed its base period uses (see preceding immediately above 100 percent of base period volume), it can file an FEA Form No. 17 with the FEA Regional Office requesting an adjustment of its base period volume (211.83 (c)(2)). If the utility needs propane in excess of 100 percent base period use, it must apply to the FEA National Office in order to obtain a waiver of ceiling limitations on propane (211.10 (g)(8)).

(The above only applies if the utility already has a propane capability.)

Definitive FEA policies on utility use of propane as of this date aren't yet worked out. This should be worked through shortly.

Propane can be imported by an industrial end-user without securing permission from the FEA.

For alternate fuel capability purposes, *butane* is neither as readily available nor easy to utilize. In the U.S., butane is used primarily for gasoline blending. Because it is heavier than propane and has a higher boiling point, it does not gasify as readily. Consequently, butane is not readily adaptable to dilution with air for Btu content reduction to obtain a natural gas substitute similar to propane/air mixtures. There are almost no local butane suppliers. If the end-user is situated near a refinery, he might be able to secure butane. If an *industrial* end-user is able to acquire butane, he files an FEA Form No. 17 with the FEA Regional Office requesting an *adjustment* in volume not to exceed 100 percent of his base period volume (211.93 (b)). If, however, he is seeking a new supply of *butane* or desires an amount beyond his current base use, as with propane, he must file wtih the FEA National Office to secure a *waiver* of ceiling limitations (211.1 (g)(8)).

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[*] *Ibid.*

May 16, 1976

Dear Mr._____________:

Transcontinental Gas Pipeline Co., our Supplier, currently projects a system-wide curtailment for the winter period (Nov. 16, 1975, to April 15, 1976) of 43.5%. At this rate of curtailment, it will be necessary for ____________ Power Company to curtail the supply of gas to its firm industrial customers. This curtailment will be instituted in accordance with the Curtailment Plan (enclosed), which is on file with the Public Service Commission.

__________________will be curtailed 25% of the volume used during the base period which was the twelve (12) months ending April 1973. Usage during the base period and allocated volumes are indicated on the enclosure.

Allocations are on a monthly basis and ______________may use the allocated volumes at your convenience provided that your daily consumption does not exceed the limitations in the existing contract. ______________ will be responsible for monitoring the monthly consumption. By prior arrangements with _______________ Power Company, some allocated volumes may be transferred between the months.

________________ Power Company will adjust the demand charges of the "WF" Tariff to reflect monthly allocations. It must be remembered that these projections reflect only our best present knowledge and are subject to change as the supply position changes.

We, again, urge you to contact both Federal and State Officials to make them aware of the situation and its effect upon your operation.

Very truly yours,

John Doe
Supervisor
Industrial Services Div.

Enclosures

	BASE PERIOD CONSUMPTION	ALLOCATED VOLUME AT 25% CURTAILMENT
NOV.	81,420	71,243
DEC.	72,500	54,375
JAN.	83,520	62,640
FEB.	88,480	66,360
MAR.	64,600	48,450
APR.	55,330	48,414

PROJECTED NATURAL GAS CURTAILMENT

Month	Base Period Use of Natural Gas In Mcf	Natural Gas To Be Available In Mcf	Natural Gas To Be Curtailed In Mcf
Nov. 1975	81,420	71,243	10,177
Dec.	72,500	54,375	18,125
Jan. 1976	83,520	62,640	20,880
Feb.	88,480	66,360	22,120
Mar.	64,600	48,450	16,150
April	55,730	48,414	7,316
TOTAL	446,250	351,482	94,768

BASE PERIOD USE OF NATURAL GAS

Month of Base Period	Natural Gas In Mcf
April, 1972	55,730
May	45,570
June	35,840
July	20,900
Aug.	21,720
Sept.	40,270
Oct.	66,160
Nov.	81,420
Dec.	72,500
Jan., 1973	83,520
Feb.	88,480
Mar.	64,600
TOTAL	676,710

Average monthly use of natural gas: 56,392.5 Mcf

FEDERAL ENERGY OFFICE

Request for Assignment of a Supplier
or Adjustments of Base Period Supply Volume
(FEO-17 (1-74))

Instructions

General Instructions

1. Who Submits and Where to Submit.
   a. The following should submit this form to their current or prospective supplier:
      (1) Wholesale purchasers who do not have a supplier.
      (2) Wholesale purchasers who need to establish a base period supply volume.
      (3) Wholesale purchasers who have had unusual growth (more than 10% per year for motor gasoline and more than 5% per year for all other products) since the base period and wish to adjust their base period supply volume
      (4) Wholesale purchasers who wish to adjust their base period supply volume to cover certified increases in volume from end users allocated on the basis of 100% of current requirements.
   b. The following should submit this form to the appropriate Regional Office of FEO:
      (1) Wholesale purchasers who wish to adjust their base period supply volume to cover certified increases in volume from end users allocated on the basis of a percentage of base period supply.
      (2) Suppliers who question the validity of this application.
      (3) Suppliers who have approved an adjustment of the base period supply volume in excess of 25%.
      (4) Wholesale purchasers who request an adjustment in the base period supply volume due to curtailment or abandonment of service of an energy socurce other than residual fuel oil or refined petroleum products.
   c. The following should submit this form to the FEO National Office:
      (1) International air carriers requesting allocations of non-bonded fuels.
      (2) Civil Air Carriers and Public Aviation requesting redistribution of aviation fuels.
2. Fuels Covered

____ 110 Propane
____ 120 Butane
____ 130 Propane/Butane
____ 200 Motor Gasoline
____ 310 Kerosene
____ 320 #2 Heating Oil
____ 330 Diesel Fuel
____ 340 Other Middle Distillates
____ 410 Aviation Gasoline
____ 420 Kerosene Jet Fuel
____ 430 Naphtha Jet Fuel
____ 510 #4 for Utilities
____ 520 #5 & #6 for Utilities
____ 530 #4 for Non-Utilities
____ 540 #5 & #6 for Non-Utilities
____ 550 Bunker C
____ 560 Navy Special
____ 570 Other Residuals
____ 710 Lubricants
____ 720 Special Naphthas
____ 730 Solvents
____ 740 Miscellaneous

3. General Information
   Adjustment or assignment for only one type of product can be requested on this form. If information on this form is not complete, the form will be returned to you. *Forms sent to FEO should be submitted in triplicate.*

Specific Instructions

1. Name of Company - Enter the corporate name, or the name of the entity making the request.
1a. Date - Enter the year, month and day of this request.
2. Street Address - Enter the street address of the company or individual making the request.
3. City - Enter the name of the city location of the company making the request.
4. State - Enter the name of the state location of the company making the request.
5. Zip Code - Enter the zip code of the company making the request.
6. Employer Identification Number - Enter the nine digit number that is used in all filings with the Internal Revenue Service.
7a. Person to Contact - Enter the name of the person to contact from the requesting company.
7b. Telephone - Enter the telephone number (Including area code) of the person to contact from the requesting company.
8a., 8b., 8c., & 8d. Street Address, City, State, Zip Code - Delivery Location - Enter the street address, city name, state name and zip code of the location to which the supply is to be delivered. This information should only be completed if the delivery location is different from the corporate address entered in 2., 3., & 4. above. If the delivery is to be more than one location enter the address of each location, other than that in blocks 2., 3., & 4. on separate sheet(s) and attach to this form.
9a. Storage Capacity of Delivery Location - Enter the storage capacity in gallons for each location to which the product is to be delivered.
9b. Current Inventory of Delivery Location - Enter the inventory level in gallons as of the date of this request for each location to which the product is to be delivered.
10. Type of Product - Check only one box for the type of product for which supply or supplier is being requested.
10w. Specify Grade of Product - Enter the grade of the product under request, such as Diesel #2, etc.
11. Type of Request - Check the appropriate box for the request being made.
12a. Name of Supplier - Enter the name of the supplier who is presently supplying you the product. There are four lines provided and the principal supplier should be entered on the first line. If there are more than four suppliers list on an additional sheet. If the request is for an assignment of a supplier, enter the names of potential suppliers who could provide the product to you. Rank preference of potential supplier with the highest preference on line (1).
12b. Supplier Address - Enter the city, state and zip code of the appropriate supplier.
12c. Brand Name of Supplier - Enter the brand name of supplier.
12d. % of Base Period Supplier - Enter the percentage of the annual base period volume that has been supplied by the appropriate supplier.
12e. Person to Contact & Telephone - Enter the name of the person to contact for each supplier and his telephone number including the area code.
12f. Willing to Supply? - For each supplier you have entered, indicate his willingness to supply by checking the appropriate box.
12g. Supplier's Decision on this Request - This section should be completed by the supplier. The supplier's name is entered and the appropriate box checked for approving or disapproving this request. If the request is disapproved, indicate in detail the reasons for disapproval.

13. Product Purchased For - Check the appropriate box for the type of use. If the product is for end-use rather than for resale, briefly describe how the product is used.

14. Credit or legal Problem - If there is a credit or legal problem involving your request for supply, describe the nature of the problem.

15. Base Period Supply Volume by Month - Enter for each month the gallons of product purchased during the base year.

15a. Base Period Year - Enter the base period year for which the request applies. For all products except propane, butane, and residual fuel oils the base year is 1972. For propane and butane the base period is October 1, 1972 to April 30, 1973. For residual fuel oils the base year is 1973.

15b. Total - Enter entire total of base period volume.

15c. Base Period Agree with Supplier - Check the appropriate box for agreement with the supplier's records. If the base period supply volume does not agree, attach a copy of the Base Period Supply Volume Report and briefly describe the disagreement.

16. Actual Purchases in the Last Twelve Months - Enter the gallons purchased for each month for the latest twelve complete months prior to date of this application. Enter the appropriate year, for example, may begin with March 1973 and end with February 1974. Enter the percentage of the comparable month in the base period, for example, 11790.

16a. Twelve Month Total - Enter total purchases for the last twelve months.

16b. Actual Purchases by Use Category - Enter the gallons purchased in the last twelve months summarized for each use category. Only the following use categories are applicable.

____ Agricultural Production
____ Emergency Services
____ Energy Production
____ Sanitation Services
____ Telecommunications
____ Transportation Services
____ Space Heating
____ Industrial and Manufacturing
____ Cargo, freight and mail hauling
____ Utilities
____ Medical and Nursing Buildings
____ Civil Air Carriers
____ General Aviation
____ Public Aviation
____ Marine Shipping
____ Others

Indicate the use category name on the appropriate line. Space is provided for three use categories. If more than three are needed attach additional sheets using the same format prescribed herein. Also enter the appropriate year and the percentage of the comparable month in the base period.

17. Requested Adjusted Base Period Supply Volume - Enter for each month the gallons requested for the adjusted base period supply volume. This information should be included for all requests such as establishment of a base period supply, adjustment of a base period supply due to growth, allocation for non-bonded fuels or establishment of base period supply due to curtailment of other energy source. Also enter the appropriate year, for example, 1974. Enter the percentage of the comparable month in the base period, for example, 125% if the request is an adjustment to base period supply volume.

17a. Requested Adjusted Base Period Supply - Total - Enter the twelve month total for the requested adjusted base period supply volume.

18. Justification For Volumes Requested - Describe in detail the reasons justifying these requested volumes. Indicate the names and telephone numbers of major customers whose requirements have substantially increased or major new customers who will be supplied. Also indicate the end-use for each of these customers and the impact on customers' operations if the request is denied.

If the requested volumes are for your own end-use, give a description including facilities or equipment, major changes since the base period, usage rates and how the rates are determined. For the addition of new equipment attach certified statement concerning usage rates and operational capacity.

If requested volumes are as a consequence of curtailed access to other sources of energy, or pursuant to a plan filed in compliance with a rule or order of a Federal or State Agency, indicate the energy source denied and its BTU equivalent.

19. Applied to State for Exceptional Hardship - If you have applied to the state for an exceptional hardship for the type of product under request, check the appropriate box. If "yes", indicate the state to which application was made, date of application, reason for hardship, quantity of product requested and the resolution of the hardship.

20. Application to the Federal Government - Indicate whether you have ever requested an assignment of a supplier or an adjustment of a base period supply for the type of product under request. Check the appropriate box and enter the case number if the answer is "yes".

21. Other Significant Factors - Enter any other significant factors or remarks that are important to this request.

22. List Titles of Attached Sheets - Enter the titles of the attached sheets in this section of the form.

23. Certification - The form must be certified both by the person completing it, and also by the person or a senior representative of the firm on whose behalf the request is submitted.

24. International Air Carriers Certification - For such requests, this additional certification is required by a senior company official.

Form Approved OMB 042R-1682

FEDERAL ENERGY OFFICE
MANDATORY PETROLEUM PRODUCTS ALLOCATION PROGRAM
REQUEST FOR ASSIGNMENT OF A SUPPLIER
OR ADJUSTMENT OF BASE PERIOD SUPPLY VOLUME

Do Not Write in this Box.
Case # ______
Received ______
Processed ______
Reply Sent ______

1. Name of Company: Home Mfg. Co.

1a. Date: Year ___ Month ___ Day ___

2. Street Address: 917 Wilton Ave.

3. City: Orgone

4. State: RS

5. Zip Code: 41960

6. Employer Identification Number (Internal Revenue Service Number): ______

7a. Person to Contact: A. Jones

7b. Telephone (Include Area Code): (202) 254-3330

8. Location to which supply is delivered (If different from above - Attach additional sheets if more than one location - Complete 8a. through 8d.)

8a. Street Address - Delivery Location: Same

8b. City: ______

8c. State: ______

8d. Zip Code: ______

9a. Storage Capacity of Delivery Location (Gallons): 950,000

9b. Current Inventory of Delivery Location (Gallons): 175,159

10. Type of Product: Complete separate form for each type of fuel.

10a. ☒ 110 Propane
10b. ☐ 120 Butane
10c. ☐ 130 Propane/Butane Mix
10d. ☐ 200 Motor Gasoline
10e. ☐ 310 Kerosene
10f. ☐ 320 #2 Heating Oil
10g. ☐ 330 Diesel Fuel
10h. ☐ 340 Other Middle Distillates
10i. ☐ 410 Aviation Gasoline
10j. ☐ 420 Kerosene Jet Fuel
10k. ☐ 430 Naphtha Jet Fuel
10l. ☐ 510 #4 for Utilities
10m. ☐ 520 #5 & #6 for Utilities
10n. ☐ 530 #4 for Non-Utilities
10o. ☐ 540 #5 & #6 for Non-Utilities
10p. ☐ 550 Bunker C
10q. ☐ 560 Navy Special
10r. ☐ 570 Other Residuals
10s. ☐ 710 Lubricants
10t. ☐ 720 Special Naphthas
10u. ☐ 730 Solvents
10v. ☐ 740 Miscellaneous

10w. Specify Grade of Product: Commercial

11. Type of Request (Please Check)

11a. ☒ Request For Assignment of Supplier *
11b. ☒ Request for Assignment of Base Period Supply Volume
11c. ☐ Request for Adjustment of Base Period Supply Volume - Adjustment less than 20%.*
11d. ☐ Request for Adjustment of Base Period Supply Volume - Adjustment Equal To or Greater Than 20%*
11e. ☐ Request for Assignment of Non Bonded Fuels (See Instructions)

*All adjustments must be greater than 10% for motor gasoline and 5% for all other products.

*Due to curtailment of natural gas

12. Name and Address of Suppliers (or Potential Suppliers if Requesting Assignment of a Supplier) - Complete 12a. through 12f. List principal supplier on the first line and others below. If more than four, provide additional sheets.

12a. Name of Supplier	12b. Supplier Address (City, State, Zip)	12c. Brand Name of Supplier	12d. % of Base Period Supplied	12e. Person to Contact & Telephone	12f. Willing to Supply?
(1) Independent LPG	P.O. Box 344 Butyl, RS 42911	Lynn	-0-	E.Smith (202)254-3330	Yes X No __
(2)					Yes __ No __
(3)					Yes __ No __
(4)					Yes __ No __

12g. Supplier's Decision on this request - Completed by Supplier.

Supplier Name: Independent LPG . Please check appropriate box.

☒ Approved ☐ Disapproved If disapproved, indicate reasons for disapproval.

E. Smith

13. Product Purchased For:

_______ Resale

XX End Use - describe briefly: Assembly plant -- See documents attached

14. If there is a credit or legal problem involving your supply, briefly describe (Attach additional information if necessary).

--NONE--

15. Base Period Supply Volume by Month (Gallons) NONE

15a. Base Period Year 4-72 thru 3-73

January		May		September	
February		June		October	
March		July		November	
April		August		December	

15b. Base Period Supply Volume Total -0-

15c. Does this base period supply volume agree with your supplier?
Check ☐ Yes ☐ No If "No" attach copy of Base Period Supply Volume Report and briefly describe disagreement.

16. Actual purchases in the last twelve months and the percentage of the comparable base period month. (Total for all use categories in 16b.)

Month	Year	Gallons	% of Base Period	Month	Year	Gallons	% of Base Period
January	19 75	43,999		July	19		
February	19			August	19		
March	19			September	19		
April	19			October	19		
May	19			November	19		
June	19			December	19 74	172,706	

16a. Actual Purchases in the last twelve months. Total 216,705

16b. Actual purchases in the last twelve months and the percentage of the comparable base period month by use category. (Space for three use categories is provided. If more than three exist, attach additional sheets using the following format.)

(1) Use Category Industrial & manufacturing (Indicate name) Testing Safety of New Propropane Stand-by Facilities

Month	Year	Gallons	% of Base Period	Month	Year	Gallons	% of Base Period
January	1975	43,999		July	19		
February	19			August	19		
March	19			September	19		
April	19			October	19		
May	19			November	19		
June	19			December	1974	172,706	
					Total	216,705	

(2) Use Category _______________ (Indicate name) _______________

Month	Year	Gallons	% of Base Period	Month	Year	Gallons	% of Base Period
January	19			July	19		
February	19			August	19		
March	19			September	19		
April	19			October	19		
May	19			November	19		
June	19			December	19		
					Total		

(3) Use Category ______________________ (Indicate name) ______________________

Month	Year	Gallons	% of Base Period	Month	Year	Gallons	% of Base Period
January	19			July	19		
February	19			August	19		
March	19			September	19		
April	19			October	19		
May	19			November	19		
June	19			December	19		
					Total		

17. Requested adjusted base period supply volume and the percentage of the comparable base period month.

Month	Year	Gallons	% of Base Period	Month	Year	Gallons	% of Base Period
January	1976	238,032		July	19		
February	1976	252,168		August	19		
March	1976	184,110		September	19		
April	1976	83,402		October	19		
May	19			November	1975	116,018	
June	19			December	1975	206,625	
17a. Requested adjusted base period supply volume					Total	1,080,355	

18. Justification for volumes requested in item 17 above. Describe in detail the reasons justifying this request. (See Instructions)

SEE ATTACHED

19. Have you applied to the State for exceptional hardship? Check ☐ Yes ☐ No If "yes", briefly describe.

20. Have you ever filed this form with the Federal Government for the type of fuel you are presently requesting action? Check ☐ Yes (If yes give case #) ☒ No

21. Other significant factors, special requirements, or remarks (Provide additional sheets if required).

All fuel to be used as process fuel.
No conversions made since March 31, 1973, to any other fuel other than propane.

22. List titles of attached sheets.

23. Certification - I hereby certify that the above statements are true, accurate, and complete to the best of my knowledge and that any quantity requested for priority use will be used only for that use.

F. Young

F. Young

Signature of person completing form

A. Jones, Plant Manager

Signature and title of certifying company official

24. **International Air Carriers:**
Additional Certification for Assignment of Non-Bonded Fuels - I hereby certify that bonded fuel supplies are not available at any price to provide a level of fuel comparable to the average percentage of base period fuel currently supplied to other international air carriers operating into the U.S.

Signature and title of certifying company official

Title 18 USC Sec. 1001 makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fradulent statements or representations as to any matter within its jurisdiction.

FEO-17(1-74)50M
(Supercedes OOG-PAP-17-11-73)

* U.S. GPO: 1974—532-961/5101

INFORMATION REQUIRED FROM COMPANIES BEING CURTAILED FROM NATURAL GAS WHERE A MIDDLE DISTILLATE IS REQUESTED AS AN ALTERNATE FUEL UNDER SECTION 211.12(h).

1. Completed Form FEA-17.

2. Description of business including a brochure, if available.

3. Estimate of effect that denial of the request would have on the business.

4. Notice of curtailment. (Should show beginning month curtailment will be in effect, and ending month if not on a 12-month basis).

5. Expected availability of natural gas in MCF by month for the period for which approval is requested as furnished by the natural gas supplier.

6. The company should identify the end uses it considers to be entitled to the 100 percent of current requirements allocation level. Also furnish the last twelve months' usage and the proposed usage for the next twelve months in BTUs based on expected natural gas availability of:
    a. Natural gas
    b. Middle distillate

7. Where the applicant is using natural gas for space heating, the natural gas and middle distillate base period use by month during the base period (1972) may be requested. Seperately identify space heating and non-space heating. (May be documented on Form FEA-17).

8. Description of efforts and contacts made to find a supplier if unable to do so (where applicable).

9. Documentation of suppliers willingness to supply (where applicable).

INFORMATION REQUIRED FROM COMPANIES BEING CURTAILED FROM NATURAL GAS WHERE RESIDUAL FUEL OIL IS REQUESTED AS AN ALTERNATE FUEL UNDER SECTION 211.12(h).

1. Completed Form FEA-17.
2. Description of business including a brochure, if available.
3. Estimate of effect that denial of the request would have on the business.
4. Notice of curtailment. (Should show beginning month curtailment will be in effect, and ending month if not on a 12-month basis).
5. Expected availability of natural gas in MCF by month for the period for which approval is requested as furnished by the natural gas supplier.
6. Total purchases by month during the base period (1973) in BTU and MCF of natural gas.
7. Natural gas, and residual fuel oil uses since the base period that have been changed to an alternate energy source. Show seperately for each end use or process the base period use by month in BTUs of:
    a. Natural gas
    b. Residual fuel oil
8. The company should identify the end uses it considers to be entitled to the 100 percent of current requirements allocation level. Information sufficient to document that such identified uses do, in fact, qualify for "current requirements" shall also be furnished. Also furnish for each such end use or process by month the last twelve months' usage and the proposed usage for the next twelve months in BTUs based on expected natural gas availability of:
    a. Natural gas
    b. Residual fuel oil
9. Description of efforts and contacts made to find a supplier if unable to do so (if applicable).
10. Statement from current supplier(s) as to willingness to supply increased volumes (if applicable).

11. Status of appeal to State Public Utility Commission or Federal Power Commission for relief from natural gas curtailment. Where applicable, the following:
    a. Copy of decision
    b. When filed
    c. Current status

12. Status of state set-aside request (if applicable).

13. Statement as to availability and efforts made to purchase surplus residual fuel oil.

14. Update on ongoing basis of natural gas availability. Advise the company to notify FEA of any change in natural gas availability for the period covered by any approval. Before approval is granted for a subsequent period, a statement of actual volumes received during the approval period should be furnished.

EXAMPLE CASE RESOLUTION

(Alternate fuel allocation level 100 percent of base period use)

	236,600 Base period consumption of natural gas (MCF)	X	177,450 Natural gas to be available (MCF)
—	0 Conversions to alternate energy source (equivalent MCF)	X	1,035,000 BTU/MCF
÷	91,500 BTU/gal. alternate fuel	=	669,074 Gal. alternate fuel

INFORMATION REQUIRED FROM COMPANIES BEING CURTAILED FROM NATURAL GAS WHERE PROPANE OR BUTANE IS REQUESTED AS AN ALTERNATE FUEL INDER SECTION 211.12(h).

1. Description of business including a brochure, if available.

2. Estimate of effect that denial of the request would have after taking into consideration the availability of non-Canadian imports.

3. Notice of curtailment. (Should show beginning month curtailment will be in effect, and ending month if not on a 12 month basis).

4. Volume of propane or butane requested on a monthly basis.

5. Expected availability of natural gas in MCF by month for the period for which approval is requested as furnished by the natural gas supplier.

6. Total monthly purchases during propane base period in BTU and MCF (or gallons as appropriate) of:
   a. Propane
   b. Butane
   c. Natural gas

7. Natural gas, propane and butane uses since the base period that have been changed to an alternate energy source. Show the following:
   a. Each end use or process
   b. For each end use or process the propane base period use by month in BTUs of:
      -- Natural gas
      -- Propane
      -- Butane

8. The company should identify the end uses it considers to be entitled to the 100 percent of current requirements allocation level. Information sufficient to document that such identified uses do, in fact, qualify for "current requirements" shall also be furnished. Also furnish for each such end use or process by month the last twelve months' usage and the proposed usage for the next twelve months in BTUs based on expected natural gas availability of:
   a. Natural gas
   b. Propane
   c. Butane

9. Where the applicant is using natural gas for boiler fuel or space heating, the natural gas, propane and butane base period use by month during propane base period is needed. Separately identify space heating and boiler fuel usage. Show separately for each end use or process by month the propane base period use in BTUs of:
   - a. Natural gas
   - b. Propane
   - c. Butane

10. The company is required to identify processes (end uses) that can be converted to alternate energy sources (other than propane, butane or natural gas). Request the company to furnish supporting documentation to justify its continued use of natural gas, propane or butane. Documentation may include but is not limited to statements by or studies conducted by recognized consultants such as engineering firms attesting to the technical feasibility of using an alternate energy source. If conversion is technically practical, company should furnish schedule for conversion. Where conversion to an alternate source of energy is not under active consideration, the company should furnish a detailed explanation including estimated const, engineering practibility, environmental considerations, competitive factors, etc.

11. Proposal by the applicant to use its own stored product if applicable.

12. Status of appeal to State Public Utility Commission or Federal Power Commission for relief from natural gas curtailment. Where applicable, the following:
   - a. Copy of decision
   - b. When filed
   - c. Current status
   - d. If not filed -- Why not? Filing plans?

13. Status of state set-aside request (if applicable).

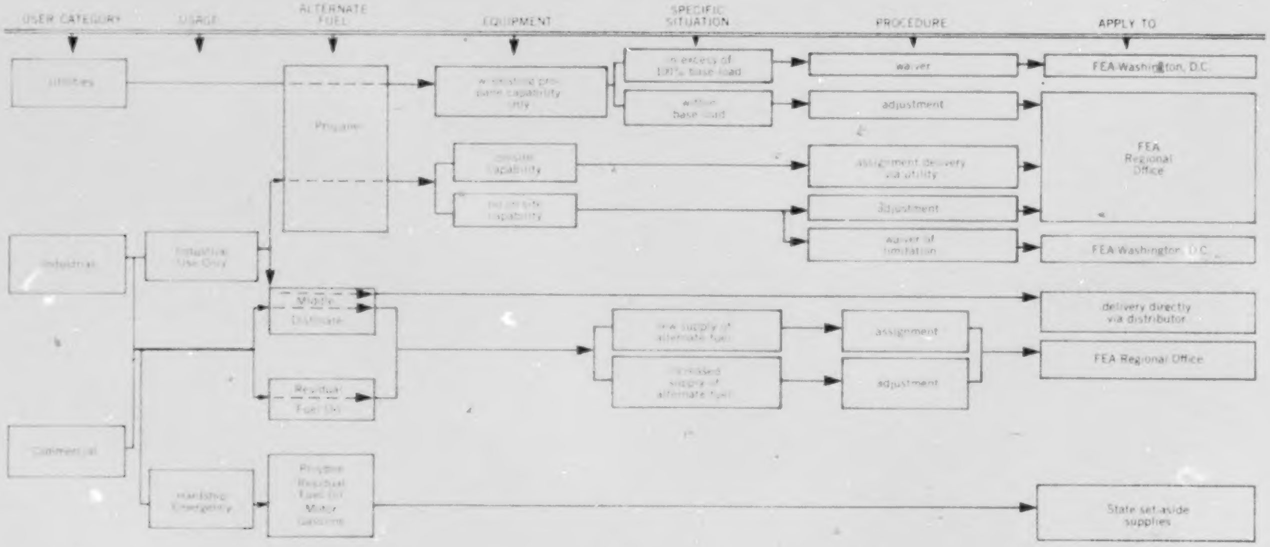
14. Statement as to why non-Canadian imports are not being purchased and used to offset expected curtailment.

15. Update on ongoing basis of natural gas availability. Advise the company to notify FEA of any change in natural gas availability for the period covered by any approval. Before approval is granted for a subsequent period, a statement of actual volumes received during the approval period should be furnished.

16. Industrial users requesting assignments of propane or butane which will be processed by a gas utility for industrial uses should furnish FEA with the following in addition to the above information as applicable:
    a. A statement that delivery of product through a utility is necessary;
    b. A written verification that the applicant has no facilities to use a fuel other than pipeline gas;
    c. A copy of the applicants agreement with the utility company concerning the financial and logistical arrangements for the product requested;
    d. Complete information on the extent of curtailment being experienced or projected;
    e. A statement from the utility that furnishing propane or butane to the applicant in this manner is consistent with all applicable Federal and State laws, regulations, and orders.

FEA Guide to Alternate Fuels (Curtailment Situation)

(Butane omitted as unlikely candidate)


USER CATEGORY
USAGE
ALTERNATE FUEL
EQUIPMENT
SPECIFIC SITUATION
PROCEDURE
APPLY TO
Utilities
Propane
w/existing propane capability only
in excess of 100% base load
within base load
waiver
adjustment
FEA Washington, D.C.
FEA Regional Office
onsite capability
no on-site capability
assignment delivery via utility
adjustment
waiver of limitation
FEA Washington, D.C.
Industrial
Industrial Use Only
Middle Distillate
Residual Fuel Oil
delivery directly via distributor
new supply of alternate fuel
increased supply of alternate fuel
assignment
adjustment
FEA Regional Office
Commercial
Hardship Emergency
Propane Residual Fuel Oil Motor Gasoline
State set-aside supplies

FEDERAL ENERGY ADMINISTRATION

CURTAILED ENERGY USERS

Guidelines for Adjustments and Assignments of Alternate Fuels

On January 25, 1975, the Federal Energy Administration issued "Guidelines for Adjustments and Assignments of Propane and Butane to Purchasers Whose Supplies of a Source of Energy Have Been or May be Curtailed as Provided by 10 CFR 211.12(h)" (40 FR 4485, January 30, 1975). Because of the natural gas curtailments anticipated for the 1975–1976 winter, FEA expects there will be increasing requests by curtailed natural gas users for supplier assignments or base period use adjustments for alternate fuels subject to the Mandatory Petroleum Allocation Regulations (10 CFR, Part 211). Since alternate fuels could be allocable products other than propane and butane, FEA has expanded its earlier Guidelines for making assignments and adjustments of propane and butane to curtailed energy users pursuant to 10 CFR 211.12(h) so that they now apply to all allocable products. The revised Guidelines are contained in the Appendix accompanying this Notice.

Although the revised Guidelines are discretionary and are not rules or regulations, FEA will accept written comments from interested persons with respect to these Guidelines. Data, views or arguments concerning the Guidelines may be submitted to Executive Communications, Room 3309, Federal Energy Administration, Box ET, Washington, D.C. 20461. Comments should be identified on the outside envelope and on documents submitted to Executive Communications, FEA, with the designation "Curtailment Guidelines." Fifteen copies should be submitted by December 15, 1975.

Any information or data considered by the person furnishing it to be confidential must be so designated and submitted in writing, one copy only. The FEA reserves the right to determine the confidential status of the information or data and to treat it according to its determination.

The Guidelines have been reviewed in accordance with Executive Order 11821 and have been determined not to require evaluation of their inflationary impact.

A copy of the Guidelines has been submitted to the Administrator of the Environmental Protection Agency for his comments.

The "Guidelines for Adjustments and Assignments of Propane and Butane to Purchasers Whose Supplies of a Source of Energy Have Been or May Be Curtailed as Provided by 10 CFR 211.12(h)" issued January 25, 1975 (40 FR 4485, January 30, 1975) are hereby revoked.

Issued in Washington, D.C., November 21, 1975.

DAVID G. WILSON,
Acting General Counsel

APPENDIX

GUIDELINES FOR ADJUSTMENTS AND ASSIGNMENTS OF ALTERNATE FUELS TO PURCHASERS WHOSE SUPPLIES OF A SOURCE OF ENERGY HAVE BEEN OR MAY BE CURTAILED AS PROVIDED BY 10 CFR 211.12(h)

1. *Scope*. These guidelines are issued to provide a consistent basis for application of FEA regulations with respect to adjustments of base period uses of and assignments of suppliers for wholesale purchaser-consumers and end-users of alternate fuels (other than utilities), whose supplies of a source of energy have been or may be subject to curtailment or abandonment of service pursuant to a plan filed in compliance with an order or rule of a Federal or State agency. See § 211.12(h) of the Mandatory Petroleum Allocation Regulations [10 CFR 211.12(h)].

"Alternate fuel" means any allocated product which is used as a substitute for a source of energy which is subject to curtailment or abandonment of service pursuant to a plan filed in compliance with an order or rule of a Federal or State agency.

2. *General*. (a) These guidelines are to be used by FEA National and Regional offices in considering applications for adjustments and assignments pursuant to 10 CFR 211.12(h). They do not constitute regulations, and thus an applicant not coming exactly within the scope of these guidelines should not assume that its application will necessarily be denied. Applicants whose applications are denied may seek review of such denials under 10 CFR, Part 205, Subpart H, to urge that application of these guidelines to the particular case is contrary to 10 CFR 211.12(h) or is otherwise inconsistent with FEA regulations. Conversely, the FEA need not apply these guidelines to all applications, and non-application of these guidelines in such cases is not an adequate basis to support appeals from such decisions.

(b) In reviewing a request for an assignment or adjustment pursuant to § 211.12(h), consideration should be given to these guidelines and the criteria of 10 CFR, Parts 211 and 205 (Subparts B and C). In doing so, it may not be possible in many cases to assign a supplier or grant an adjustment because of the effect of the assignment or adjustment upon available supplies of the alternate fuel.

(c) FEA Regional Offices should make adjustments and assignments consistent with these guidelines and 10 CFR 211.12(h) for alternate fuels except that concurrence from FEA National Office should be obtained for any assignment or adjustment, regardless of volume, where such assignment or adjustment deviates from these guidelines. In addition, National Office approval should be obtained whenever an adjustment or assignment would result in a wholesale purchaser-consumer's receiving in the aggregate 250,000 gallons or more of propane in any period corresponding to a base period.

(d) Adjustments and assignments consistent with these guidelines and 10 CFR 211.12(h) will also apply to products or activities administered by the FEA National office (butane, DOD requirements, etc.). Applications concerning these matters should be addressed as follows:

Federal Energy Administration, Office of Specialty Fuels and Products, 2000 M Street, NW., Washington, D.C. 20461.

(e) Adjustments and assignments of alternate fuels to wholesale purchaser-consumers and end-users made pursuant to 10 CFR 211.12(h) should be consistent with the appropriate sections of Subparts B and C of Part 205 of 10 CFR. Adjustment and assignment orders should be for complete periods corresponding to base periods, unless the adjustment or assignment is temporary under the provisions of 10 CFR 205.29 or 205.39.

(f) Adjustments to and assignments of base period use should not only take into account the applicant's need for a product but also the effect that an adjustment or assighment will have upon the base period supplier's or assigned base period supplier's allocation fraction in order to mitigate any significant adverse impact upon a supplier's other customers.

(g) The assignment of a supplier should be made in accordance with 10 CFR, Part 205, Subpart C.

(1) For both permanent and temporary assignments FEA should consider the following:

(i) Goal of equalizing allocation fractions among suppliers; and

(ii) Capability of supplier to supply new customers on short notice. (Logistical problems; available inventories in the purchaser's area.)

(2) FEA should weigh the relative allocation fractions heavily in selection of a supplier for assignment orders. The two or three available suppliers with the highest fractions should receive the major share of assignments in each region. Obviously, other suppliers may have to share if the volume is so great that logistical or supply problems are raised by assigning to only two or three firms. In some cases it may not be possible to assign a supplier or make an adjustment because of the impact of such an assignment or adjustment upon available suppliers.

(h) Assignments and adjustments pursuant to 10 CFR 211.12(h) shall not be made for purchasers in circumstances where no curtailment specified in 10 CFR 211.12(h) has occurred or may occur. Assignments and adjustments for end-users and wholesale purchaser-consumers which have not been curtailed as specified in 10 CFR 211.12(h) shall be consistent with the provisions of 10 CFR 211.12(e), 211.12(f) and 211.13.

(i) End-users and wholesale purchaser-consumers should be advised of the availability of the State set-aside to meet hardship and emergency requirements as provided by 10 CFR 211.17.

(j) In evaluating an applicant's requirements for the purpose of assignment or adjusting its base period use, each use that the applicant has for the fuel should be separately assessed in accordance with appropriate allocation levels in determining whether and the extent to which the assignment or adjustment can be made in light of prevailing supply conditions and the effect such assignments and adjustments would have upon outer purchasers of a supplier.

(k) FEA anticipates that most assignments and adjustments for propane and butane will be under allocation levels for industrial uses. The most important of these uses is industrial use as a process or plant protection fuel as defined by 10 CFR 211.82. Other industrial uses, such as use for boiler fuel or space heating, are considered to be less critical uses of propane. In its assessment of applications for such uses, FEA will consider the ability of applicants to convert to an energy system which is fueled by an energy source other than propane, butane or natural gas.

(l) In general, it is not FEA's policy to grant applications for assignments and adjustments of propane and butane to gas utilities experiencing curtailment since gas utilities are able themselves to curtail gas service to industrial end-users who possess an alternate fuel capability.

(2) FEA may grant assignments or adjustments of propane or butane to industrial users who have no facilities for use of propane or butane and who propose to transfer the propane or butane to a gas utility for storage, gasification and transmission back to the industrial user in gaseous form on a BTU equivalent basis. This procedure may be followed only in those cases where the industrial user bears the entire cost of the product and any charges for its storage, gasification and transmission, where there will be no adverse effects on the gas utility's other customers; where the industrial user has no facilities for using a fuel other than pipeline gas; and where this procedure is consistent with all applicable Federal and State laws, regulations and orders. State regulatory practices, as may relate to this procedure vary and it is the responsibility of the utility to adhere to those regulations.

FEA will not consider applications from a utility itself nor applications submitted by a utility on behalf of a group of industrial users. Each industrial firm must apply separately. However, FEA will not necessarily deny requests for which a utility has taken the initiative in locating a supplier of propane or butane and has prepared an application for an industrial end-user.

(i) A statement that delivery of product through a utility is necessary;

(ii) A written verification that the applicant has no facilities to use a fuel other than pipeline gas;

(iii) A copy of the applicant's agreement with the utility company concerning the financial and logistical arrangements for the product requested;

(iv) Complete information on the extent of curtailment being experienced or projected;

(v) Volume of propane or butane requested as alternate fuel; and

(vi) A statement from the utility that furnishing propane or butane to the applicant in this manner is consistent with all applicable Federal and State laws, regulations and orders.

(4) *FEA evaluation and treatment of applications.*—(i) FEA may contact the utility involved to verify that the cost of purchase, storage, and gasification and the transmission of a gaseous fuel of an equal BTU content is to be borne solely by the applicant. Information on the utility's inventories of propane or butane may also be requested.

(ii) The application will be evaluated and a determination on the appropriate volume to be assigned will be made based on criteria outlined below in Section 3(b)(2) of these guidelines.

(iii) Applications for butane should be submitted to the National FEA at the address given in 2(d) above. Applications for propane should be submitted to the appropriate FEA regional office.

(l) Applicants seeking assignment and adjustments of propane and butane should be strongly urged to seek immediate assistance in obtaining supplies of natural gas from the Federal and State agencies which have regulatory authority over suppliers or supplies of natural gas and to take adequate steps to protect themselves from future curtailments by installing an energy system which is capable of being fueled by an energy source other than natural gas, propane or butane.

(m) In evaluating an application for assignment or adjustment of propane and butane FEA should consider the extent to which the energy system which is capable of being fueled by an energy source other than natural gas, propane or butane is technically feasible for meeting the applicant's energy requirements. FEA should consider what steps have been taken to obtain an alternate fuel capability. FEA should also consider the extent to which an applicant has exhausted its administrative remedies through the Federal and State agencies which have regulatory authority over suppliers or supplies of natural gas.

3. *Allocation levels.* As noted, care should be taken to ascertain the proper allocation level for the end-user or wholesale purchaser-consumer.

(a) *Allocation levels not subject to an allocation fraction.*—(1) *Agricultural Production.*—(i) Assignments of base period suppliers for end-users and wholesale purchaser-consumers without a base period supplier with access to the allocation level for agricultural production should be made in accordance with the provisions 10 CFR, Part 205, Subpart C.

(ii) Since this allocation level is expressed in terms of current requirements, an adjustment of base period use pursuant to 10 CFR 211.12(h) cannot be made. Ordinarily the applicant will not apply for increased current requirements since his supplier will have certified those requirements pursuant to 10 CFR 211.13(d). Thus, FEA will generally be involved only to the extent that a dispute as to whether a claim for increased requirement is valid [10 CFR 211.12(d)(4)]. Usual validation procedures should be pursued in those instances to determine the extent of any increased current requirements for agricultural production.

(2) *Department of Defense use.* All assignments for Department of Defense use as specified in 10 CFR 211.26 shall be made by the FEA National Office in accordance with the general principles of these guidelines.

(b) *Allocation levels subject to an allocation fraction.*—(1) *One hundred percent of current requirements subject to an allocation fraction.*—(i) A decision to assign a base period supplier to an applicant which does not have a base period supplier of an alternate fuel and which is entitled to an allocation level of one hundred percent of current requirements subject to an allocation fraction should be made in accordance with the provisions of 10 CFR, Part 205, Subpart C.

(ii) Since this allocation level is expressed in terms of current requirements, an adjustment of base period use pursuant to 10 CFR 211.12(h) cannot be made. To the extent that these users have increased current requirements they should follow the procedures under 10 CFR 211.13(d) which require that the user certify its increased requirements to its base period supplier. Ordinarily FEA or the appropirate State office will be involved only if a validation of such increased current requirements is required.

(2) *Percent of base period use subject to a fraction.*—(i) Assignments of a supplier and a base period use may be made if the applicant does not have a base period supplier and base period use. The assigned base period use should be calculated in the following manner:

Determine in BTU's the amount of energy consumed by the petitioner in each base period. Base periods shall be the same as that for the particular allocable product being requested as an alternate fuel.

Where any process or end-use which utilized volumes of the curtailed energy source during the base period has since been discontinued or converted to use another source of energy other than the alternate fuel being sought, the BTU value of the product used for such discontinued or converted process or end-use should be subtracted from the total amount of energy consumed during the base period.

Subtract the BTU value of the volume of the curtailed source of energy which is or will be available after curtailment during the period corresponding to the base period for the allocable product which is being sought as an alternate fuel.

Convert the BTU difference into volume of allocable product being requested. This volume is the maximum base period use which should generally be assigned for the period corresponding to the base period.

(ii) If the applicant has an established base period use for an allocable product as an alternate fuel, an adjustment may be made if circumstances permit. An adjustment to base period use should be calculated in the following manner:

Determine in BTU's the total amount of energy (energy sources subject to curtailment plus all allocable products used) consumed by the petitioner in the base period. Base periods shall be the same as that for the particular allocable product being requested as an alternate fuel.

Where any process or end-use which utilized volumes of the curtailed energy source during the base period has since been discontinued or converted to use another source of energy other than the alternate fuel being sought, thhe BTU value of the product used for such discontinued or converted process or end-use should be subtracted from the total amount of energy consumed during the base period.

Subtract the BTU value of the volume of the curtailed source of energy which is and will be available after curtailment during the period corresponding to the base period for which the adjustment to base period use is being sought.

Convert the BTU difference into volume of allocable product for which an adjustment has been requested.

Subtract the base period use of alternate fuel for which the petition is being made to determine the maximum adjustment which should generally be made for the period corresponding to the base period.

[FR Doc.75-31851 Filed 11-21-75;10:20 am]

Section 2.4

Local Relief Options

Before applying to the FPC for additional supplies of natural gas (or to the FEA for an assignment of or an adjustment in his alternate fuel allocation), there are a number of options that the end-user should explore.

The first step and the easiest is to go to his natural gas company, the distributor, and tell him that for whatever reason he needs more gas. This request can sometimes be met if the distributor has some operational flexibility. The distributor will be cooperative, when possible, because the gas utilities have an interest in maintaining healthy customer relationships. Distributors also want the cooperation and active participation of their customers in curtailments, so they try to maintain as good a relationship as possible. For example, the situation might arise when the distribution company must call the end-user and tell him that they are being forced to cut back deliveries because they do not have enough gas. The user may be asked to reduce his production in order to consume less gas. If the distribution company wants this type of cooperation, it should be willing to help out the end-user at other times.

There may be times, too, when the end-user cannot acquire any natural gas. For a variety of reasons the distribution company cannot come up with additional supplies or operational flexibility, at least on its own initiative. In this situation there are two steps that are available to the end-user: "pooling" and appealing to the State public utility commission. The second step is normally not initiated until all attempts at the first have proven fruitless.

Sometimes, when supplies of natural gas are inadequate to provide for all needs in a given local distribution system, the industrial users supplied by a single distribution company will try to settle the problem among themselves.

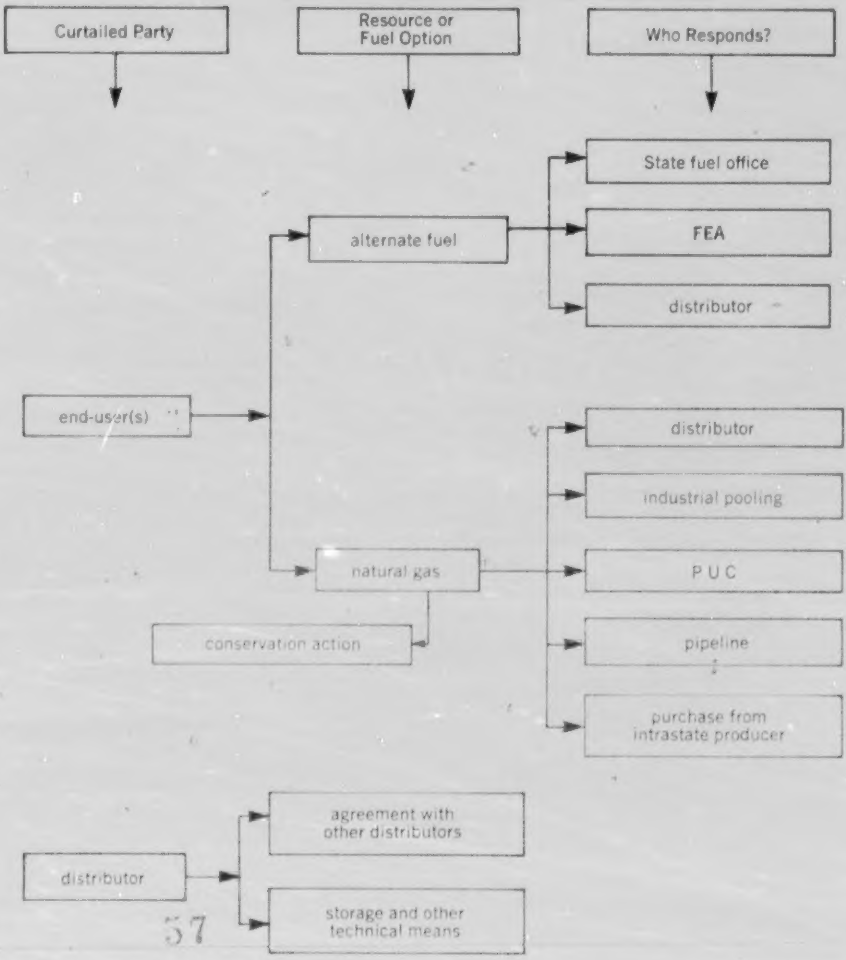
If, for some reason, pooling does not work, then the end-user can file for relief before the State public utility commission and the commission will decide whether or not to hold a hearing on his behalf. This usually is done when the end-user feels that he has been treated unfairly. Generally, this is not a particularly attractive option. First, because the curtailment plans, which are based on end-use, are generally in the tariff provisions of the utility company approved by the commission, the commission may refuse to accept a hearing or the end-user may lose the case. Second, hearings usually require substantial time and can be rather complicated. In most cases, it appears that neither the plaintiffs (the end-users) nor the defendants (the utilities) are anxious to become involved in commission hearings. So each party tries to do its best to settle the problem between themselves. It is important, however, to alert the end-user that this option is open to him if, indeed, he feels that he is being given unfair treatment.

If a variety of natural gas-dependent companies or industries located in a single community are suffering from curtailment, the community can undertake a strong conservation campaign to try to minimize the demands being made on available supplies. For example, when Danville, Virginia, was suffering from curtailments in 1974-75, a number of conservation efforts were launched, including radio broadcasts by locals advocating conserving gas to preserve jobs, merchants setting their thermostats at 65° and placing posters in their windows, taking out full-page ads in the local newspapers, and banners hanging across main streets.

Very occasionally, a heavy natural gas user may be located sufficiently near a natural gas producer to make it feasible to buy gas directly from him. Undertaking such arrangements, however, will probably be rather costly if any long-distance pipelines must be constructed. This should be checked out.

Because of the disparate situations existing among the states, it is impossible to outline a firm local option guide. The above are suggested merely as starting points. Once the local situation has been carefully and completely assessed, a number of other specific avenues will probably arise. In any event, it is important to make sure that every attempt is made to work with the distribution companies, which often have sufficient flexibility to solve the end-user's problem. Each of the above avenues should be explored before turning to the FPC for help; in most cases, the FPC will ask if these have been explored first anyway.

Options at Local (Regional) Level



Section 3

Governmental and Industrial Organizations

Purpose

This section will serve primarily as an address book to be used by staff on location. It will permit them to contact Government and industrial organizations to familiarize them with the specifics of their local problem.

Contents

- Federal Regions.
- Department of Commerce Field Offices.
- Federal Energy Administration Regional Offices.
- State government energy offices.
- Public utility commissions.
- Major trade associations in fuels.
- Major trade associations by SIC code.

Federal Regional Council Offices

(Areas included within each region are indicated on the map on the following page.)

Region	Regional Chairman	Address	Phone
I	David W. Hays	c/o Federal Regional Council Secretariat, John F. Kennedy Bldg., Boston, Mass. 02203.	617-223-5421.
II	S. William Green	26 Federal Plaza, New York, N.Y. 10007	212-264-8068.
III	Daniel J. Snyder III	Federal Bldg., 600 Arch St., Philadelphia, Pa. 19106	215-597-9815.
IV	Jack E. Ravan	c/o Federal Regional Council, 1371 Peachtree St. NW., Atlanta, Ga. 30309.	404-526-2287.
V	Norman Erbe	300 S. Wacker Dr., Chicago, Ill. 60606	312-353-4000.
VI	Ed Foreman	c/o Southwest Federal Regional Council, 1100 Commerce St., Dallas, Tex. 75202.	214-749-1431.
VII	Elmer E. Smith	Federal Office Bldg., 911 Walnut St., Kansas City, Mo. 64106	816-374-2661.
VIII	Samuel Martinez	c/o Federal Regional Council, Federal Bldg., 1961 Stout St., Denver, Colo. 80202.	303-837-2741.
IX	Webster Otis	450 Golden Gate Ave., P.O. Box 36098, San Francisco, Calif. 94102	415-556-8200.
X	Bernard Kelly	Arcade Plaza Bldg., 1321 2d Ave., Seattle, Wash. 98101	206-442-1593.

Federal Executive Boards

Federal Executive Boards (FEBs) were established for the purpose of improving internal Federal management practices in major metropolitan centers of Federal activity.

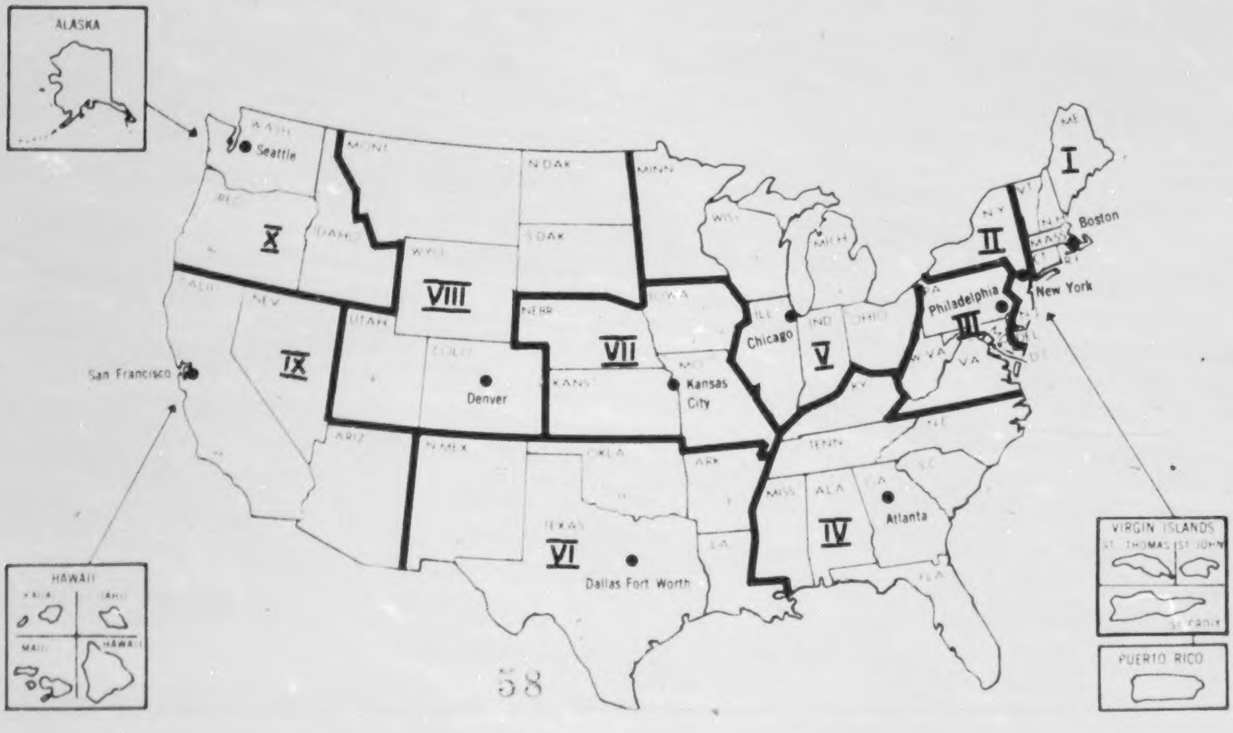
Federal Executive Boards serve as alternative lines of communication, in addition to the primary department and agency channels, for disseminating information within the Federal Government, for training, and for discussing Federal policies and activities of special interest to the President and Federal executives in the field.

The Boards assist in mobilizing Federal field personnel in emergency situations, organize program or administrative specialists to work on management problems, and prepare special publications. The Boards also act as a focal point in concentrating Federal resources in response to community-metropolitan needs.

Federal Executive Boards are composed of heads of Federal field offices in the metropolitan area. A Chairman is elected annually by Board members, and other officers are appointed or elected from among the membership. Committees and task forces undertake the annual projects of the Boards. The Boards receive overall policy direction from the Office of Management and Budget.

Currently, Federal Executive Boards are located in 25 cities which are important centers of Federal activity. These cities are: Alburquerque-Santa Fe, Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas-Ft. Worth, Denver, Detroit, Honolulu, Kansas City, Los Angeles, Miami, New Orleans, New York, Newark, Philadelphia, Pittsburgh, Portland, St. Louis, San Francisco, Seattle, and the Twin Cities (Minneapolis-St. Paul).

STANDARD FEDERAL REGIONS


ALASKA
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OAHU
MAUI
HAWAII
VIRGIN ISLANDS
ST. THOMAS
ST. JOHN
ST. CROIX
PUERTO RICO

Hours shown are Eastern Standard Time

U.S. Department of Commerce Field Offices

ALABAMA

Birmingham

DIB 9:30am - 6:00pm

Gayle C Shelton Jr Director, Suite 200, 908 S 20th St. 35205 (Area Code 205) Tel 325-3327 FTS325-3327

Montgomery

EDA 9:30am - 6:00pm

John T Bagwell, James A Geesey, Economic Development Representatives, 732 Aronov Bldg.,474 S Court St., 36104 (Area Code 205) Tel 832-7125 FTS 534-7125

ALASKA

Anchorage

DIB 1:30pm - 10:00pm

Everett W Buness, Director, Room 412 Hill Bldg.,632 Sixth Ave.,99501 (Area Code 907)Tel 265-5597

EDA 11:30am - 8:00pm

Clyde S Courtnage, Economic Development Representative Suite 455, 632 Sixth Ave.,99501 (Area Code 907)Tel 265-5317

NOA 12:30pm - 9:30PM

Stuart G Bigler, Director, Alaska Region, National Weather Service, 632 Sixth Ave 95501 (Area Code 907) Tel 265-4701

Juneau

NOA 1:30pm - 10:00pm

Harry L Rietze, Director, Alaska Region, National Marine Fisheries Service PO Box 1668,99802 (Area Code 907) Tel 586-7221 FTS206 442-0150 ask for907 586-7221

ARIZONA

Phoenix

DIB 10:30am - 7:00pm

Donald W Fry Director, 508 Greater Arizona Savings Bldg.,112 N Central Ave.,85004 (Area Code 602) Tel261-3285 FTS261-3285

EDA 10:30am - 7:00pm

Paul A Luke, Carl D Metz,Economic Development Representatives, Suite 512,112 N Central Ave 85004 (Area Code 602) Tel 261-3818 FTS261-3818

ARKANSAS

Little Rock

EDA 9:30am - 6:00pm

Willeen M Hough, Economic Development Representative,PO and Court Bldg, Rm151,72201 (Area Code 501) Tel 378-5637 FTS378-5637

CALIFORNIA

Fresno

EDA 11:30am - 8:00pm

Nephi W Clayton, Economic Development Representative, Suite 101,2502 Merced St,93721 (Area Code 209) FTS487-5356

LaJolla

NOA 11:00am - 7:30pm Dr.Brian J Rothschild, Director, Southwest Fisheries Center, National Marine Fisheries Service, 8604 LaJolla Shores Dr., P.O.Box 271,92037 (Area Code 714) Tel 453-2820 FTS453-2820

Long Beach

MA 11:15am - 7:45pm

Oliver T Henry, Heartwell Bldg, 19 Pine Ave, Suite 507, 90802 (Area Code 213) Tel 437-2878 FTS831-9438

Los Angeles

CEN 11:30am - 8:00pm

C Michael Long, Regional Director, Regional Office, 11209 Federal Office Bldg.,11000 Wilshire Blvd, 90024 (Area Code 213) Tel 824-7291 FTS 824-7291

DIB 11:30am - 8:00pm

Eric C Silberstein Director, 11201 Federal Office Bldg.,11000 Wilshire Blvd.90024 (Area Code 213) Tel 824-7591 FTS 824-7591

EDA 11:30am - 8:00pm

Wilfred Marshall Economic Development Representative,11000 Wilshire Blvd, Room 11204,90024 (Area Code 213) Tel 824-7521

Oakland

EDA 11:30am - 8:00pm

Hugh Taylor, Economic Development Representative, 77 Jack London Square, Suite K 94607 (Area Code 415) Tel 273-7081 FTS 273-7081

Sacramento

EDA 11:30am - 8:00pm

Ralph G Cowles, Economic Development Representative, Room W-1446, 2800 Cottage Way, 95825 (Area Code 916) Tel 484-4314 FTS 484-4314

San Francisco

DIB 11:30am - 8:00pm

Philip M Creighton, Acting Director, Federal Bldg, Box 36013, 450 Golden Gate Ave, 94102 (Area Code 415) Tel 556-5868 FTS 556-5868

MA 11:15am - 7:45pm

Thomas J Patterson Jr, Western Region Director, 450 Golden Gate Ave, Box 36073, 94102 (Area Code 415) Tel 556-3816 FTS 556-3816

MBE 8:30am - 5:00pm

Ramon Romero, Director, Federal Bldg., Room 15043, Box 36114, 450 Golden Gate Ave. 94102 (Area Code 415) FTS 556-7234

NTIS 11:30am - 8:00pm

Kyuma Mano, Chief, US Joint Publications Research Service, Room 53, 100 McAllister St., 94102 (Area Code 415) Tel 556-3382 FTs 556-3382

SEC 11:30am - 8:00pm

Miguel P Barrios, Jr, Regional Manager Audits, Federal Bldg., Box 31134,450 Golden Gate Ave. 94102 (Area Code 415) Tel 556-7223 FTS556-7223

San Pedro

MA 11:15am - 7:45pm

CALIFORNIA—Continued

Peter Muntz, Area Representative, 825 S Beacon St, Room5, 90731 (Area Code 213) Tel 831-9281, Ext 9508 FTS 831-9508

Terminal Island

NOA 11:00am - 7:30pm
Gerald V Howard, Director, Southwest Region,National Marine Fisheries Service, 300 S Ferry St.,90731 (Area Code 213) Tel 548-2575 FTS548-2575

COLORADO

Boulder

NBS 10:00am - 7:00pm
B W Birmingham, Deputy Director, IBS/Boulder, 80302 (Area Code 303) Tel 499-1000 Ext 3237 FTS 499-3237

NOA 10:00am - 7:00pm
Dr Wilmot N Hess, Director Environmental Research Laboratories, 80302 (Area Code 303) Tel 499-1000 FTS 499-6357

Alan H Shapley, Director, National Geophysical and Solor-Terrestrial Data Center 80302 (Area Code 303) Tel 499- 1000 FTS 499-6215

OT 8:00am - 5:00pm
Douglass D Crombie, Acting Director, Institute for Telecommunications Sciences, 80302 (Area Code 303) Tel 499-1000 Ext 4215 FTS 499-1000, Ext 4215

Denver

CEN 9:30am - 6:00pm
Walter A Freeman Jr, Regional Director, Regional Office, 10111 WestSixth Avenue 80255 PO Box 25207 (Area Code 303) Tel FTS 234-3924

DIB 10:30am - 7:00pm
John G McMurtry, Director, Room 161, New Custom House, 19th & Stout Sts, 80202 (Area Code 303) Tel 837-3246 FTS 837-3246

EDA 10:30am - 7:00pm
Reinhold P Rinne, Economic Development Representative, Suite 505 Title Bldg., 909 17th St, 80202 (Area Code 303) Tel 837-3057 FTS 873-3057

Craig M Smith, Regional Director, Suite 505 Title Bldg 909 17th St 80202 (Area Code 303) FTS 837-4714

Fort Collins

NBS Open 24 Hrs
John B Milton, Engineer in Charge, WWV/WWVB (LF and VLF) Radio Station, 2000 East County Road 58, 80521 (Area Code 303) Tel 484-2228 FTS 484-2228

CONNECTICUT

Hartford

DIB 8:30am - 5:00pm
Richard C Kilbourn, Director, Room 610B Federal Office Bldg, 450 Main St, 06103 (Area Code 203) Tel 244-3530 FTS 244-3530

EDA 8:30am - 5:00pm
Charles N Hammarlund, Economic Development Representative, 60 Washington St, 06106 (Area Code 203) Tel 244-2336 FTS 244-2336

FLORIDA

Miami

DIB 8:30am - 5:00pm
Roger J LaRoche, Director, 821 City National Bank Bldg, 25 W Flagler St, 33130 (Area Code 305) Tel 350-5267 FTS350-5267

NOA 8:00am - 4:30pm
Harvey R Bullis Jr, Director, Southeast Fisheries Center, National Marine Fisheries Service, 75 Virginia Beach Drive 33149 (Area Code 305) 361-5761 FTS 350-1111

St Petersburg

NOA 8:00am - 4:30pm
William H Stevenson, Director, Southeast Region, National Marine Fisheries Service, Duvall Bldg., 9450 Gandy Blvd 33702 (Area Code 813) Tel 893-3141 FTS 893-3141

Tallahassee

EDA 8:30am - 5:00pm
John R Jones, Economic Development Representative, Suite 203, 547 N Monroe St, 32304 (Area Code 904) Tel 224-8525 FTS 377-4244

GEORGIA

Atlanta

Cen 8:30am - 5:00pm
Thomas W McWhirter, Regional Director, Regional Office, 1401 Peachtree St, N.E. Room 569,30309 (Area Code 404) Tel 526-5318 FTS 526-5318

CPC 8:30am - 5:00pm
Field Director (Vacant) Room 801 Fulton Federal Bldg 11 Pryor St, S.W. 30303 (Area Code 404) FTS 526-4482

DIB 8:30am - 5:00pm
David S Williamson, Director, Rm 523, 1401 Peachtree St, N.E. 30309 (Area Code 404) Tel 526-6000 FTS 526-6000

EDA 8:30am - 5:00pm
Leroy B Anderson, Economic Development Representative, Suite 555, 1401 Peachtree St., N.E. 30309 (Area Code 404) Tel 526-6388 FTS 526-6388

Charles E Oxley, Regional Director, Suite 555, 1401 Peachtree St N.E. 30309 (Area Code 404) Tel 526-6401 FTS 526-6401

MBE 8:30am - 5:00pm
Charles F McMillan, Director, Suite 505, 1371 Peachtree St., N.E. 30309 (Area Code 404) FTS 526-5091

SEC 8:00am - 4:30pm
Natalie Micka, Regional Manager Audits, 1365 Peachtree St., N.E. Room 430, 30309 (Area Code 404) Tel 526-5578 FTS 526-5578

Savannah

DIB 8:30am - 5:00pm
James W McIntire, Director, 235 US Court House & Post Office Bldg., 125-29 Bull St, 31402 (Area Code 912) Tel 232-4204 FTS 232-4321 Ext 204

Hours shown are Eastern Standard Time

HAWAII

Honolulu

DIB 1 30pm - 10 00pm
John S Davies, Director, 286 Alexander Young Bldg, 1015 Bishop Street, 96813 (Area Code 808) Tel 546-8694

NOA 1 30pm - 10 00pm
Director, Charles M Woffinden, National Weather Service, Box 3650, Bethel-Pauahi Bldg, Room 516, 96811 Tel 808 546-5680

Kekaha, Kauai

NBS Open 24 Hrs
Engineer in Charge, Radio Station WWVH, Box 417, 96572 (Area Code 808) Tel Kauai 335-4361

IDAHO

Boise

EDA 11 30am - 8 00pm
Aldred F Ames, Economic Development Representative, Room 473 New Federal Bldg, 6th & Fort St, 83702 (Area Code 208) Tel 342-2711 Ext 2521 FTS 342-2521

ILLINOIS

Carbondale

EDA 8 30am - 5 00pm
Arnold E Ramsey, Economic Development Representative, Suite D 606 East Main St, 62901 (Area Code 618) Tel 549-0765 FTS 525-4200

Chicago

CEN 9 30am - 6 00pm
Forrest P Cawley Jr, Regional Director, Regional Office, 536 S Clark St, Room 1085, 60605 (Area Code 312) Tel 353-6251 FTS 353-6251

DIB 9 30am - 6 00pm
Gerald M Marks, Director, 1406 Mid Continental Plaza Bldg, 505 East Monroe St, 60603 (Area Code 312) Tel 353-6957 FTS 353-6957

EDA 8 30am - 5 00pm
James E Peterson, Regional Director, 1025 Civic Towers Bldg, 32 West Randolph St, 60601 (Area Code 312) Tel 353-7706 FTS 353-7706

MA 9 30am - 6 00pm
Market Development Specialist, (Vacant) 1486 New Federal Bldg, 219 South Dearborn St, 60604 (Area Code 312) Tel 353-7514 FTS 353-7514

OMBE 8 30am - 5 00pm
John Smith, Director, Suite 1438, 55 E Monroe St, 60603 (Area Code 312) Tel 353-8375 FTS 353-8375

SEC 9 30am - 6 00pm
William L Tibbs, Regional Manager Audits, Mid-Continental Plaza Bldg, Room 1411, 55 East Monroe St, 60603 (Area Code 312) Tel 353-7188 FTS 353-7188

Clearing

NBS 9 30am - 6 00pm
B F Banks, in Charge, Master Railway Track Scale Depot, 5800 West 69th St, (Area Code 312) Tel 458-0655

INDIANA

Indianapolis

DIB 9 30am - 6 00pm
Milton R Sherar, Trade Specialist-in-Charge, Room 357 Federal Bldg & U S Courthouse, 46 R Ohio St, 46204 (Area Code 317) Tel 269-6214 FTS 269-6214

EDA 9 30am - 6 00pm
William E Wilson, Economic Development Representative, Room 414 Federal Courts Bldg, 46 E Ohio Street, 46204 (Area Code 317) Tel 269-6210 FTS 269-6210

Jeffersonville

CEN 8 00am - 4 30pm
O Bryant Benton, Chief, Data Preparation Division, 1201 E 10th St, 47130 (Area Code 812) Tel 283-3511 Ext 344 FTS 283-1344

IOWA

Des Moines

DIB 9 30am - 6 00pm
Jessie N Durden, Director, 609 Federal Bldg, 210 Walnut St, 50309 (Area Code 515) Tel 284-4222 FTS 284-4222

KANSAS

Kansas City

CEN 9 30am - 6 00pm
Rex Pullen, Regional Director, Regional Office, Gateway Center, 4th & State Sts, 66101 (Area Code 816) Tel 374-4601

Pittsburg

CEN 9 30am - 6 00pm
Francis N Allai, Acting Chief, Personal Census Service Branch, Walnut and Pine Sts, 66762 (Area Code 316) Tel 231-7100

KENTUCKY

Hopkinsville

EDA 9 30am - 6 00pm
William G Glasscock, Economic Development Representative, P O Box 241, 210 East 9th St, 42240 (Area Code 502) Tel 885-5311

Lexington

EDA 9 30am - 6 00pm
Economic Development Representative (Vacant) 190 N Upper St, Room 112, 40507 (Area Code 606) Tel 252-2312 Ext 2596 FTS 252-2596

LOUISIANA

Baton Rouge

EDA 9 30am - 6 00pm
Charles R Pate, Economic Development Representative, Room 301-302 Federal Bldg & Court House, 707 Florida Blvd 70801 (Area Code 504) Tel 348-0181 Ext 227 FTS 348-4227

New Orleans

DIB 9 30am - 6 00pm
Edwin A Leland, Jr, Director, 432 International Trade Mart No 2 Canal Street, 70130 (Area Code 504) Tel 589-6546 FTS 589-6546

LOUISIANA—Continued

MA 8:30am - 5:00pm
Frank X McNerney, Central Region Director, 701 Loyola Ave, (Area Code 504) Tel 589-6556 FTS 589-6568

MAINE

Augusta

EDA 8:30am - 5:00pm
Philip H Bartram, Economic Development Representative, Room 101C Federal Office Bldg, 40 Western Ave, 04330 (Area Code 207) Tel 622-6171 Ext.272 FTS 622-6271

MARYLAND

Annapolis

OT 8:30am - 5:00pm
Stanley I Cohn, Director, ECAC Liaison Office, 1923-4 West St, 21401 (Area Code 301) Tel 261-2688

Baltimore

DIB 8:30am - 5:00pm
Carroll F Hopkins, Director, 415 Customhouse, Gay and Lombard Sts, 21202 (Area Code 301) Tel 962-3560 FTS 962-3560

Frostburg

OT 8:30am - 5:00pm
Elmer C Rexrode, Supervisor, IRAC Computer Support Section, 2nd Floor American Legion Bldg, 21532 (Area Code 301) Tel 689-8873 FTS 800-540-1170

MASSACHUSETTS

Boston

DIB 8:30am - 5:00pm
Richard F Treadway, Director, 441 Stuart St, 10th Fl, 02116 (Area Code 617) Tel 223-2312 FTS 223-2312

CEN 8:30am - 5:00pm
Arthur G Dukakis, Regional Director, Regional Office, 441 Stuart St, 10th Fl, 02116 (Area Code 617) Tel 223-2327 FTS 223-2327

EDA 8:30am - 5:00pm
William A Fitzhenry, Economic Development Representative, 441 Stuart St, 02116 (Area Code 617) Tel 223-6468 FTS 223-6468

Gloucester

NOA 8:00am - 4:30pm
Russell T Norris, Director, Northeast Region, National Marine Fisheries Service, Federal Bldg, 14 Elm Street, 01930 (Area Code 617) Tel 281-0640 FTS 281-0640

Louis J Ronsivalli, Director, Northeast Utilization Research Center, National Marine Fisheries Service, Emerson Avenue, 01930 (Area Code 617) Tel 283-6600

Woods Hole

NOA 8:00am - 4:30pm
Dr Robert L Edwards, Director, Northeast Fisheries Center, National Marine Fisheries Service, 02543 (Area Code 617) Tel 548-5123

MICHIGAN

Detroit

CEN 8:30am - 5:00pm
Robert G McWilliam Regional Director, Regional Office, 2100 Washington Blvd Bldg, 234 State St., 48226 (Area Code 313) Tel 226-7742 FTS 226-7742

DIB 8:30am - 5:00pm
William Welch Director, 445 Federal Bldg, 230 W Fort St, 48226 (Area Code 313) Tel 226-3650 FTS 226-3650

NOA 8:00am - 4:30pm
Cdr. Darrell W Crawford, Director, Lake Survey Center, National Ocean Survey, 630 Federal Bldg and U S Court House,48226 (Area Code 313) FTS 226-6161

Lansing

EDA 8:30am - 5:00pm
James L Collison, Economic Development Representative, 112 E Allegan St., Room 306,48933 (Area Code 517) Tel 372-1621

MINNESOTA

Bemidji

EDA 9:30am - 6:00pm
Stanley J Pechaver, Economic Development Representative, 415 Federal Bldg 56601 (Area Code 218) Tel 751-4415 FTS 725-4242

Duluth

EDA 9:30am - 6:00pm
John B Arnold III, Economic Development Representative 407 Federal Bldg, 515 W. First St., 55802 (Area Code 218) Tel 727-6326 FTS 727-6326

Minneapolis

DIB 9:30am - 6:00pm
Glenn A Matson, Director, 306 Federal Bldg, 110 S Fourth St, 55401 (Area Code 612) Tel 725-2133 FTS 725-2133

MISSISSIPPI

Jackson

EDA 9:30am - 6:00pm
Bobby D Ainsworth, Economic Development Representative, 630 Milner Bldg, 210 S Lamar St., 39201 (Area Code 601) Tel 969-4342 FTS 969-4342

MISSOURI

Crestwood

EDA 9:30am - 6:00pm
Forrest E Koch, Economic Development Representative, Crestwood Bank Bldg., Room 201,9705 US Highway 66, 63126 (Area Code 314) FTS 425-3309

Kansas City

DIB 9:30am - 6:00pm
George H Payne, Director, Room 1840, 601 E 12th St,64106 (Area Code 816) Tel 374-3142 FTS 374-3142

NOA 7:00am - 4:00pm
Charles G Knudsen, Director, Central Region, National Weather Service, Room 1836, 601 E 12th St, 64106 (Area Code 816) Tel 374-5464 FTS 374-5464

MISSOURI—Continued

St Louis

DIB 9:30am - 6:00pm
Donald R Loso, Director, 120 South Central Avenue 63105 (Area Code 314) Tel 622-4243 FTS 425-3302

MONTANA

Butte

EDA 10:30am - 8:00pm
Mary A Rowling, Economic Development Representative, Federal Office Bldg, 59701 (Area Code 406) Tel 723-3382 FTS 723-3382

NEVADA

Reno

DIB 10:30am - 7:00pm
Joseph J Jeremy, Director, 2028 Federal Bldg, 300 Booth St 89502 (Area Code 702) Tel 784-5203 FTS 784-5203

NEW JERSEY

Highlands

NOA 8:00am - 4:30pm
Dr C J Sindermann, Director, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service Box 428, 07732 (Area Code 201) Tel 872-0200 FTS 872-0200

Newark

DIB 8:30am - 5:00pm
Clifford R Lincoln, Director, Gateway Bldg, 4th Floor 07102 (Area Code 201) Tel 645-6214 FTS 645-6214

Trenton

EDA 8:30am - 5:00pm
Clifford J Rossignol, Economic Development Representative, Federal Bldg, 402 E State St, Room 501, 08608 (Area Code 609) Tel 599-3511 Ext 244 FTS 599-3244

NEW MEXICO

Albuquerque

DIB 10:30am - 7:00pm
William E Dwyer, Director, U S Courthouse, Room 316, 87101 (AreaCode 505) Tel 766-2386 FTS 766-2386

Santa Fe

EDA 10:30am - 7:00pm
James S Swearingen, Economic Development Representative, Room 209 Federal Bldg, Cathedral Place, 87501 (Area Code 505) Tel 988-6557 FTS 988-6557

NEW YORK

Albany

EDA 8:30am - 5:00pm
Michael Daley, Economic Development Representative, 100 State St, Room 939, 12207 (Area Code 518)Tel 472-3688 FTS 472-3688

Buffalo

DIB 8:30am - 5:30pm
Robert F Magee, Director, 1312 Federal Bldg, 111 West Huron St, 14202 (Area Code 716) Tel 842-3208 FTS 842-3208

Garden City

NOA 8:00am - 4:30pm
Silvio G Simplicio, Director, Eastern Region National Weather Service, 585 Stewart Avenue, 11530 (Area Code 516) Tel 248-2101 FTS 212-995-8633

Kings Point

MA 8:00am - 4:30pm
Arthur B Engel, Superintendent, US Merchant Marine Academy, 11024 (Area Code 516) Tel 482-8200 Ext 349 FTS 482-8200

National Maritime Research Center, U S Merchant Marine Academy, 11024 (Area Code 516) Tel 482-8200 FTS482-8200

New York City

CEN 8:30am - 5:00pm
John C Cullinane, Regional Director, Regional Office, 41st Floor Federal Office Building, 26 Federal Plaza 10007 (Area Code 212) Tel 264-3860 FTS 264-3860

DIB 8:45am - 5:15pm
Arthur C Rutzen, Director, 41st Floor Federal Bldg, 26 Federal Plaza 10007 (Area Code 212) Tel 264-0634 FTS 264-0600

Joseph Lucciola, Agent-in-Charge, Compliance Division, 3721 Federal Office Bldg, 26 Federal Plaza 10007 (Area Code 212) Tel 264-1365 FTS 264-1365

Alton B Ashendorf, Manager, Exhibits Transportation Section, 3719 Federal Office Bldg, 26 Federal Plaza 10007 (Area Code 212) Tel 264-8990 FTS 264-8990

MA 8:30am - 5:00pm
Thomas A King, Eastern Region Director, 26 Federal Plaza,10007 (Area Code 212) Tel 264-1300 FTS 264-1300

MBE 8:30am - 5:00pm
Newton Downing, Director, 26 Federal Plaza, Rm3714, 10007 (Area Code 212) FTS 264-3262

SEC 8:30am - 5:00pm
Wilbur Weisel, Regional Manager Audits, 26 Federal Plaza, Federal Bldg, Room 4146,10007 (Area Code 212) Tel 264- 1252 FTS 264-1252

NORTH CAROLINA

Asheville

NOA 8:00am - 4:30pm
William H Haggard, Director, National Climatic Center, Fed. Bldg, 28801 (Area Code 704) Tel 258-2850 FTS 254-0236

Beaufort

NOA 7:45am - 4:30pm
Dr Theodore R Rice, Director, Atlantic Estuarine Fisheries Center, National Marine Fisheries Service, PO Box 570 28516 (Area Code 919) Tel 728-4595

Charlotte

CEN 8:30am - 5:00pm
Joseph R Norwood, Regional Director, Regional Office, 510 Addison Bldg, 222 S Church St., 28202 (Area Code 704) Tel FTS 372-7471

NORTH CAROLINA—Continued

Greensboro

DIB 8:30am - 5:00pm

Joel B New, Director, 203 Federal Bldg, West Market St., PO Box 1950, 27402 (Area Code 919) Tel 275-9111 Ext. 345 FTS 275-5345

Raleigh

CPC 8:30am - 5:00pm

Dr Leigh Hammond, North Carolina Field Director, B-41 Administration Bldg, PO Box 1351,27605 (Area Code 919) FTS 828-9158

EDA 8:30am - 5:00pm

Dale R Jones, Economic Development Representative, 310 New Bern Ave, Room 314 Federal Bldg, 27611 (Area Code 919) Tel 755-4570 FTS 755-4570

NORTH DAKOTA

Bismark

EDA 10:30am - 7:00pm

Cornelius Grant, Economic Development Representative, PO Bldg, Box 1911,58501 (Area Code 701) Tel 255-4321 FTS 701-255-4321

OHIO

Athens

EDA 8:30am - 5:00pm

Philip F Lavelle, Economic Development Representative, Security Bank Bldg, Room 405, 45701 (Area Code 614) Tel 593-8146 FTS 216 522-3131

Cincinnati

DIB 8:30am - 5:00pm

Gordon B Thomas, Director, 8028 Federal Office Bldg, 550 Main St, 45202 (Area Code 513) Tel 684-2944 FTS 684-2944

Cleveland

DIB 8:30am - 5:00pm

Charles B Stebbins, Director, Room 600, 666 Euclid Ave 44114 (Area Code 216) Tel 522-4750 FTS 522-4750

OKLAHOMA

Oklahoma City

EDA 8:30am - 5:00pm

Hunter Kemmet, Economic Development Representative, 815 Old Post Office Bldg, Third and Harvey Sts, 73102 (Area Code 405) Tel 231-4197 FTS 231-4197

OREGON

Portland

DIB 11:30am - 8:00pm

J Don Chapman, Director, 521 Pittock-Block, 921 S W Washington St, 97205 (Area Code 503) Tel 221-3001 FTS 221-3001

EDA 11:30am - 8:00pm

Thomas G Current, Economic Development Representative, 584 Pittock Bldg, 921 S W Washington St, 97201 (Area Code 503) Tel 221-3078 FTS 221-3078

PENNSYLVANIA

Philadelphia

CEN 8:30am - 5:00pm

Porter Rickley, Regional Director, Regional Office, 600 Arch Street 19106 (Area Code 215) Tel 597-4920 FTS 597-4920

DIB 8:30am - 5:00pm

Patrick P. McCabe, Director, 9448 Federal Building, 600 Arch St 19106 (Area Code 215) Tel 597-2850 FTS 597-2850

EDA 8:30am - 5:00pm

Anthony M Pecone, Economic Development Representative, 10424 Federal Bldg, 600 Arch St 19106 (Area Code 215) Tel 597-2811 FTS 597-2811

John E Corrigan, Regional Director, Federal Bldg, 600 Arch St (Area Code 215) Tel 597-4603 FTS 597-4603

Pittsburgh

DIB 8:30am - 5:00pm

Newton Heston, Jr. Director, 2002 Federal Bldg, 1000 Liberty Ave., 15222 (Area Code 412) Tel 644-2850 FTS 644-2850

PUERTO RICO

Hato Rey

EDA 8:30am - 5:00pm

(Vacant), Economic Development Representative, Pan Am Bldg, 255 Ponce de Leon Ave,00917 (Area Code 202) Tel 967- 1221 ask for 809 963 6363, Ext 436

San Juan

DIB 7:30am - 4:00pm

Enrique Vilella, Director, Room 100 Post Office Bldg, 00902, Tel 723-4640

SOUTH CAROLINA

Columbia

CPC 8:30am - 5:00pm

Dr A C Flora, South Carolina Field Director, 681 Barringer Bldg, 1338 Main St, 29201 (Area Code 803) Tel 253-3461 FTS 253-3461

DIB 8:30am - 5:00pm

Philip A Ouzts, Director, 2611 Forest Drive, Forest Center 29204 (Area Code 803) Tel 765-5345 FTS 765-5345

EDA 8:30am - 5:00pm

S Townes Holland, Economic Development Representative, Suite 114 Forest Center, Rt. 3, Box 31, 29204 (Area Code 803) Tel 765-5676 FTS 765-5676

SOUTH DAKOTA

Pierre

EDA 10:30am - 7:00pm

Floyd E Taylor, Economic Development Representative, Rm 321, Federal Bldg., 57501 (Area Code 605) Tel 224-8238 FTS 224-8238

TENNESSEE

Memphis

DIB 9:30am - 6:30pm

TENNESSEE—Continued

Bradford H Rice, Director, Room 710, 147 Jefferson Ave, 38103 (Area Code 901) Tel 534-3213 FTS 534-3213

Nashville

EDA 9:30am - 6:00pm

Mitchell S Parks, Economic Development Representative, Suite 903 Federal Bldg, 801 Broadway, 37203 (Area Code 615) Tel 749-5911 FTS 749-5911

TEXAS

Austin

EDA 9:30am - 6:00pm

Jerry M Graybill,Henry N Troell, Economic Development Representatives, Suite 600, American Bank Tower, 221 West Sixth Street, 78701 (Area Code 512) Tel 397-5217 FTS 397-5217

Regional Director, Joseph B Swanner Suite 600 American Bank Tower,221 W Sixth St,78701(Area Code 512) FTS 397-5461

Dallas

DIB 9:30am - 6:30pm

H Phillip Hubbard, Acting Director, Room 3E7, 1100 Commerce St, 75202 (Area Code 214) Tel 749-1515 FTS 749-1515

CEN 9:00am - 5:30pm

Percy R Millard, Regional Director, Regional Office, 1100 Commerce St, Room 3C54, 75202 (Area Code 214) FTS 749-2814

OMBE 8:30am - 5:00pm

Henry Zuniga, Director, Suite 1702, 1412 Main Street 75202 (Area Code 214) Tel 749-7581 FTS 749-7581

SEC 9:30am - 6:30pm

Robert R Hamsher, Regional Manager Audits, Room 3E7, 1100 Commerce St, 75202 (Area Code 214) Tel 749-7241 FTS 749-7241

Fort Worth

NOA 8:45am - 5:30pm

Lawrence R Mahar, Director, Southern Region, National Weather Service, Room 10E09, 819 Taylor St,76102 (Area Code 817) 334-2668 FTS 334-2668

Galveston

NOA 8:00am - 4:30pm

Dr Joseph W Angelovic, Director, Gulf Coastal Fisheries Center, National Msrine Fisheries Service, 4700 Avenue 'U' 77550 (Area Code 713) Tel 763-1211 FTS 763-1501

Houston

DIB 9:30am - 6:00pm

Felicito C Guerrero Acting Director, 1017 Old Federal Bldg, 201 Fannin St, 77002 (Area Code 713) Tel 226-4231 FTS 226-4231

MA 9:30am - 6:00pm

George Krohn, Old Federal Bldg, 201 Fannin St, 77002 (Area Code 713) Tel 226-4209 FTS 226-4231

Lubbock

EDA 9:30am - 6:00pm

Leonard W Curfman, Economic Development Representative, Federal Bldg, 1205 Texas Avenue, Rm416,79408 (Area Code 806) Tel 762-7661 FTS 762-7661

UTAH

Salt Lake City

DIB 10:30am - 7:00pm

Sherman P Lloyd, Trade Specialist-in-Charge, 1203 Federal Bldg, 125 South State St, 84138 (Area Code 801) Tel 524-5116 FTS 524-5116

EDA 10:30am - 7:00pm

David H Allred, Economic Development Representative, 1205 Federal Office Bldg, 125 S State St, 84111 (Area Code 801) Tel 524-5119 FTS 524-5119

NOA 10:00am - 6:30pm

Hazen H Bedke, Director Western Region, National Weather Service, PO Box 11188, Federal Bldg, 125 S State St, 84111 (Area Code 801) Tel 524-5122 FTS 524-5135

VIRGINIA

Norfolk

NOA 8:00am - 4:30pm

RAdm Alfred C Holmes, Director, Atlantic Marine Center, National Ocean Survey, 439 W York St, 23510 (Area Code 804) Tel 441-6201

Richmond

DIB 8:30am - 5:00pm

Weldon W Tuck, Director, 8010 Federal Bldg, 400 N 8th St, 23240 (Area Code 804) Tel 782-2246 FTS 782-2246

EDA 8:30am - 5:00pm

Robert C Roberts, Economic Development Representative, 8002 Federal Office Bldg, 400 N 8th St, 23240 (Area Code 804) Tel 782-2567 FTS 782-2567

Wallops Island

NOA 8:00am - 4:30pm

Robert S Gray, Engineer-in-Charge, Ionosphere Research Station, Bldg E-144, NASA, 23337 (Area Code 804) Tel 824-3411 Ext 638 FTS 824-2638

WASHINGTON

Everett

EDA 11:30am - 8:00pm

Valmer W Cameron, Economic Development Representative, 4327 Rucker Ave, 98203 (Area Code 206) Tel 258-2677 FTS 259-0332

Seattle

CEN 11:00am - 7:30pm

John E Tharaldson, Regional Director, Regional Office, Lake Union Bldg, 1700 Westlake Ave, N, 98101 (Area Code 206) Tel 442-7800 FTS 442-7800

DIB 11:30am - 8:00pm

Judson S Wonderly, Director, 706 Lake Union Bldg, 1700 Westlake Ave, N, 98109 (Area Code 206) Tel 442-5615 FTS 442-5615

EDA 11:30am - 8:00pm

WASHINGTON—Continued

C Mark Smith, Regional Director, 1700 Westlake Ave.N. 98109 (Area Code 206) Tel 442-0596 FTS 442-0596

Frank McChesney, Economic Development Representative, 1700 Westlake Ave. N. 98109 (Area Code 206) Tel 442-7556 FTS 442-7556

MA 11:15am - 7:45pm
F I Huxtable, Area Representative, 311 Alaska Bldg, 618 Second Ave, 98104 (Area Code 206) Tel 583-5348 FTS 583-5348

NOA 11:00am - 7:30pm
RAdm Herbert R Lippold, Jr, Director, Pacific Marine Center, National Ocean Survey, 1801 Fairview Ave, E, 98102 (Area Code 206) Tel 442-7656 FTS 442-7656

NOA 11:00 - 7:30pm
Donald R Johnson, Director, Northwest Region, National Marine Fisheries Service, Westlake Ave., N, 98109 (Area Code 206) Tel 442-7575 FTS 442-7575

NOA 11:00am - 7:30pm
Dr Dayton L Alverson, Director, Northwest Fisheries Center, National Marine Fisheries Service, 2725 Montlake Blvd, E, 98112 (Area Code 206) Tel 442-4760 FTS 442-4760

NOA 11:00am - 7:30pm
Dr Maynard A Steinberg, Director, Pacific Utilization Research Center, National Marine Fisheries Service, 2725 Montlake Blvd., E, 98112 (Area Code 206) Tel 442-7746 FTS 442-7746

WEST VIRGINIA

Charleston

DIB 8:30am - 5:00pm
J Raymond DePaulo, Director, 3000 New Federal Office Bldg, 500 Quarrier St, 25301 (Area Code 304) Tel 343-6181 Ext 375 FTS 343-1375

Clarksburg

EDA 8:30am - 5:00pm
Rene V Zabeau, Economic Development Representative, 304 New Post Office Bldg, W. Pike St, 26301 (Area Code 304) Tel 623-3461 Ext 272 FTS 624-1272

Huntington

EDA 8:30am - 5:00pm
James M Donohoe, Economic Development Representative, 601 9th St, Suite 319, Pritchard Bldg, 25701 (Area Code 304) Tel 529-2311 Ext 591 FTS 529-2591

Beckley

EDA 8:30am - 5:00pm
Carlton P White, Economic Development Representative, B-020 Federal Bldg, 25801 (Area Code 304) Tel 253-2723 FTS 252-7313

WISCONSIN

Eau Claire

EDA 9:30am - 6:00pm
Hanford Olson, Economic Development Representative, 510 S Barstow, 54701 (Area Code 715) Tel 834-2226 FTS 834-2226

Milwaukee

DIB 9:30am - 6:00pm
Russell H Leitch, Director, Straus Bldg, 238 W Wisconsin Ave, 52303 (Area Code 414) Tel 224-3473 FTS 224-3473

WYOMING

Cheyenne

DIB 10:30am - 7:00pm
Director (Vacant) 6022 O'Mahoney Federal Center, 2120 Capitol Ave, 82001 (Area Code 307) Tel 778-2220 Ext 2151 FTS 778-2151

Federal Energy Administration

REGION I
150 Causeway St. Room 700
Boston, MA 02114
(617) 223-3701

REGION II
26 Federal Plaza, Room 3206
New York, NY
(212) 264-1023

REGION III
1421 Cherry Street
Philadelphia, PA 19102
(215) 597-3890

REGION IV
1655 Peachtree Street
Atlanta, GA 30309
(404) 526-2837

REGION V
175 W. Jackson Boulevard, Room A-333
Chicago, IL 60604
(312) 353-0540

REGION VI
P.O. Box 35228
2626 West Mocking Bird Lane
Dallas, TX 75235
(214) 749-7345

REGION VII
112 East 12th Street
P.O. Box 2208
Kansas City, MO 64142
(816) 374-2061

REGION VIII
P.O. Box 26247, Belmare Branch
1075 South Yukon Street
Lakewood, CO 80226
(303) 234-2420

REGION IX
111 Pine Street
San Francisco, CA 94111
(415) 556-7216

REGION X
1992 Federal Office Building
915 Second Avenue
Seattle, WA 98174
(206) 442-7280

State Government Energy Agencies

Alabama Energy Management Board
(205) 832-6784
Alaska State Energy Office
(907) 272-0527
Arizona Fuel Allocations Section of the Office of Economic Planning and Development
(602) 271-3303
Arkansas State Energy Office
(501) 371-1379
California Energy Resources Conservation and Development Commission
(916) 322-3690
Colorado Office of the Governor—Fuel Allocations Office
(303) 892-2471
Connecticut Department of Planning and Energy Policy
(203) 566-2800
Delaware Division of Emergency Planning and Operations
(302) 834-4531
Florida State Energy Office
(904) 488-6764
Georgia State Energy Office
(404) 656-5176
Hawaii Department of Planning and Economic Development
(808) 548-3033
Idaho State Office of Energy
(208) 384-2885
Illinois Division of Energy
(219) 782-5784
Indiana Energy Office
(317) 633-6753
Iowa Energy Policy Council
(515) 281-3428
Kansas Department of Energy
(913) 296-2496
Kentucky Department of Energy
(502) 564-7416
Louisiana Division of Natural Resources and Energy
(504) 389-5161
Maine State Fuel Allocation and Conservation Office
(207) 622-6201
Maryland Energy Policy Office
(301) 383-6810
Massachusetts Energy Policy Office
(617) 727-3482
Michigan Energy Office, Public Service Commission
(517) 373-0777
Minnesota Energy Agency
(612) 296-5120
Mississippi Fuel and Energy Management Commission
(601) 354-7406
Missouri Energy Agency
(314) 751-4000
Montana State Fuel Allocation Office
(406) 449-2860
Nebraska State Office of Petroleum Allocation
(402) 471-2867
Nevada State Energy Resources Advisory Board
(702) 385-2188
New Hampshire Governor's Council on Energy
(603) 271-2711
New Jersey State Energy Office
(201) 648-3290
New Mexico Energy Resources Board
(505) 827-2146
New York State Emergency Fuel Office
(518) 474-7928
North Carolina Energy Division
(919) 829-2230
North Dakota Office of Energy Management
(701) 224-3301
Ohio Energy Emergency Commission
(614) 466-6797
Oklahoma Department of Energy
(405) 521-3941
Oregon Department of Energy
(503) 378-4128
Pennsylvania Governor's Energy Council
(717) 787-9749
Rhode Island State Energy Office
(401) 421-7333
South Carolina Energy Management Office
(803) 758-2050
South Dakota Office of Energy Policy
(605) 224-3603
Tennessee Energy Office
(615) 741-2994
Texas Governor's Energy Advisory Council
(512) 475-4591
Utah Interdepartmental Coordinating Council for Energy Affairs
(801) 533-5356
Vermont State Energy Office
(802) 828-2768
Virginia Energy Office
(804) 770-8451
Washington State Department of Emergency Services
(206) 753-5420
West Virginia Fuel and Energy Office
(304) 348-8860
Wisconsin Office of Energy Emergency Assistance
(608) 266-8234
Wyoming Mineral Development Division
(307) 777-7284

State Public Utility Commissions

Public Service Commission
P.O. Box 991
Montgomery, **Alabama** 36102
Kenneth Hammond
President
(205) 832-3353
Wallace Tidmore
Secretary
(205) 832-3421

Public Utilities Commission
1100 McKay Building
338 Denali Street
Anchorage, **Alaska** 99501
Gordon J. Zerbetz
Chairman
(907) 272-1487
J. Lowell Jensen
Executive Director
(907) 272-1487

Arizona Corporation Commission
1688 West Adams
Phoenix, **Arizona** 85007
Albert D. Faron
Chairman
(602) 271-4241
George M. Dempsey
Executive Secretary
(602) 271-4241

Public Service Commission
Justice Building
Little Rock, **Arkansas** 72201
Robert C. Downie
Chairman
(501) 371-1453

Edward W. Davis
Executive Director
(501) 371-1794

Public Utilities Commission
350 McAllister Street
San Francisco, **California** 94102
Vernon L. Sturgeon
President
(415) 557-2440
William R. Johnson
Secretary
(415) 557-1487

Public Utilities Commission
1845 Sherman Street
Denver, **Colorado** 80203
Edwin R. Lundborg
Chairman
(303) 892-3196
Harry A. Galligan, Jr.
Secretary
(303) 892-3154

Public Utilities Control Authority
165 Capitol Avenue
Hartford, **Connecticut** 06115
Howard E. Hausman
Chairman
(203) 566-7380
Henry Mierzwa
Executive Secretary
(203) 566-2104

Public Service Commission
Old State House Annex
Dover, **Delaware** 19901
Curtis W. Steen
Chairman
(302) 678-4247
Robert J. Kennedy III
Executive Director
(302) 678-4247

Public Service Commission
700 S. Adams Street
Tallahassee, **Florida** 32304
William T. Mayo
Chairman
(904) 488-2181
Dr. J. B. Kennedy
Executive Director
(904) 488-7868

Public Service Commission
244 Washington Street, S.W.
Atlanta, **Georgia** 30334
Ben T. Wiggins
Chairman
(404) 656-4512
David O. Benson
Executive Director
(404) 656-4539

Public Utilities Commission
P.O. Box 541
Honolulu, **Hawaii** 96809
Lorrin W. Dolim
Chairman
(808) 548-7550
LeRoy Yuen
Acting Executive Director
(808) 548-7550

Public Utiilties Commission
427 W. Washington Street
Boise, **Idaho** 83720
Robert Lenaghen
President
(208) 834-3420
K. D. Smith
Secretary-Administrator
(208) 834-3420

Illinois Commerce Commission
527 East Capitol Avenue
Springfield, **Illinois** 62706
Marvin Lieberman
Chairman
(217) 782-5778
Clarence F. Hutches II
(217) 782-3624

Public Service Commission
901 State Office Building
Indianapolis, **Indiana** 46204
Larry J. Wallace
Chairman
(317) 633-5473
Max W. Tucker
Secretary
(317) 633-5409

State Commerce Commission
Walnut and Fourth Streets
Des Moines, **Iowa** 50319
Maurice Van Nostrand
Chairman
(515) 281-5167
Dean A. Briley
Executive Secretary
(515) 281-5256

State Corporation Commission
State Office Building
Topeka, **Kansas** 66612
Dale E. Saffels
Chairman
(913) 296-3325
Thelma Knutson
Executive Secretary
(913) 296-3326

Public Service Commission
Capital Plaza Tower
Frankfort, **Kentucky** 40601
William A. Logan
Chairman
(502) 564-3940
Richard D. Heman, Jr.
Secretary
(502) 564-3940
Al Humphries
Director of Engineering
(502) 564-3943

Public Service Commission
P.O. Box 44035
Capitol Station
Baton Rouge, **Louisiana** 70804
Nat B. Knight, Jr.
Chairman
(504) 389-5867
Louis S. Quinn
Secretary
(504) 389-5867

Public Utilities Commission
State House
Augusta, **Maine** 04330
Peter A. Bradford
Chairman
(207) 289-2446
Howard Cunningham
Secretary
(207) 289-2428

Public Service Commission
301 West Preston Street
Baltimore, **Maryland** 21201
Robert L. Sullivan, Jr.
Chairman
(301) 383-2371
Frank Wasowicz
Executive Secretary
(301) 383-2366

Department of Public Utilities
State Office Building
100 Cambridge Street
Boston, **Massachusetts** 02202
Harold J. Keohane
Chairman
(617) 727-3500
Francis Hickey
Secretary
(617) 727-3500

Public Service Commission
525 West Ottawa Street
Lansing, **Michigan** 48913
Daniel Demlow
Chairman
(517) 373-3240
Tom Hancock
Chief of Staff
(517) 373-3864

Public Service Commission
American Center Building
160 East Kellogg Blvd.
St. Paul, **Minnesota** 55101
Karl F. Rolvaag
Chairman
(612) 296-2436
Lawrence Anderson
Director
(612) 296-6025

Public Service Commission
P.O. Box 1174
Jackson, **Mississippi** 32905
Norman A. Johnson, Jr.
Chairman
E. W. Robinson
Executive Secretary
(601) 354-7474

Public Service Commission
Jefferson Building
Jefferson City, **Missouri** 65101
A. Robert Pierce, Jr.
Chairman
(314) 751-4221
Robert L. Gilmore
Secretary
(314) 751-4113

Public Service Commission
1227 11th Avenue
Helena, **Montana** 59601
Gordon E. Bollinger
Chairman
(406) 449-3017
William Opitz
Administrator Utility Division
(406) 449-3456

Public Service Commission
1342 M Street

Lincoln, **Nebraska** 68508
Eric Rasmussen
Chairman
(402) 475-2641
Everett W. Green
Secretary
(402) 475-2641

Public Service Commission
202 South Carson
Carson City, **Nevada** 89701
Noel A. Clark
Chairman
(702) 885-4180
William W. Proksch, Jr.
Secretary
(702) 885-4180

Public Service Commission
Cordell Hull Building
Nashville, **Tennessee** 37219
Z. D. Atkins
Chairman
(615) 741-2785
James L. Talbot
Executive Secretary
(615) 741-2904

Railroad Commission
Drawer 12967
Capitol Station
Austin, **Texas** 78711
Ben Ramsey
Chairman
(512) 475-2644
Elizabeth Navropoulis
Secretary
(512) 475-2439

Public Service Commission
330 East 4th Street
Salt Lake City, **Utah** 84114
Frank S. Warner
Chairman
(801) 328-5518
Ronald Casper
Executive Secretary
(801) 328-5515

Public Service Board
State Office Building
Montpelier, **Vermont** 05602
Martin Miller
Chairman
(802) 828-2319

State Corporation Commission
P.O. Box 1197
Richmond, **Virginia** 23209
Thomas P. Harwood, Jr.
Chairman
(804) 770-3608
Ernest M. Jordan, Jr.
Director of Division of Public Utilities
(804) 770-3614

Utilities and Transportation Commission
Highways-Licenses Building
Olympia, **Washington** 98504
Donald H. Brazier
Chairman
(206) 753-6430
Edward T. Shaw
Executive Officer
(206) 753-6402

Public Service Commission
E-217 Capitol Building
Charleston, **West Virginia** 25305
Brooks E. Smith
Chairman
(304) 348-2163
S. Grover Smith, Jr.
Secretary
(304) 348-2182

Public Service Commission
432 Hill Farms State Office Building
Madison, **Wisconsin** 53702
Richard D. Cudahy
Chairman
(608) 266-1241
James Tanner
Administrator, Utility Rates Division
(608) 266-1267

Public Service Commission
Supreme Court Building
Cheyenne, **Wyoming** 82002
Zan Lewis
Chairman
(307) 777-7427
Alex J. Eliopulos
Chief Counsel and Administrative Secretary
(307) 777-7427

Major Trade Associations in Fuels and Processing of Fuels

Gas

American Gas Association
1515 Wilson Boulevard
Arlington, Virginia 22209
Telephone: (703) 524-2000

Independent Natural Gas Association of America
1660 L Street, N.W.
Washington, D.C. 20036
Telephone: (202) 293-5770

Natural Gas Processors Association
803 Home Federal Building
Tulsa, Oklahoma 74103
Telephone: (918) 582-5112

National LP-Gas Association
79 West Monroe Street
Chicago, Illinois 60603
Telephone: (312) 372-5484

Public Utilities Commission
26 Pleasant Street
Concord, **New Hampshire** 03301
Alexander Kalinski
Chairman
(603) 271-2442
Dom S. D'Ambruoso
Secretary
(603) 271-2443

Board of Public Utility Commissioners
101 Commerce Street
Newark, **New Jersey** 07102
Anthony J. Grossi
Chairman
(201) 648-2013
Ralph Caprio
Secretary
(201) 648-2350

Public Service Commission
Bataan Memorial Building
Santa Fe, **New Mexico** 87503
Richard Montoya
Chairman
(505) 827-2827
Carroll R. Anderson
Administrator
(505) 827-2827

Public Service Commission
44 Holland Avenue
Albany, **New York** 12208
Dr. Alfred Kahn
Chairman
(518) 474-2530
Samuel R. Madison
Secretary
(518) 474-6530

Utilities Commission
Department of Commerce
Ruffin Building
1 West Morgan Street
Raleigh, **North Carolina** 27602
Marvin R. Wooten
Chairman
(919) 829-4249
Robert K. Koger
Director, Engineering Department
(919) 829-4271

Public Service Commission
State Capitol
Bismarck, **North Dakota** 58501
Ben J. Wolf
President
Miss Janet Sauter
Executive Secretary
(701) 224-2400

Public Utilities Commission
101 North High Street
Columbus, **Ohio** 43215
Luther Heckman
Chairman
(614) 466-3102
Thomas M. Lee
Director of Administration
(614) 466-4294

Corporation Commission
Jim Thorpe Office Building
Oklahoma City, **Oklahoma** 73105
Rex Privett
Chairman
(405) 521-2264
Ed Overholser
Secretary
(405) 521-2351

Public Utility Commissioner
Labor and Industries Building
Salem, **Oregon** 97310
Charles Davis
Commissioner
(503) 378-6611
Walter Paul
Assistant Commissioner for Utility Division
(503) 378-6622

Public Utility Commission
North Office Building

Room 104
Harrisburg, **Pennsylvania** 17120
James McGirr Kelly
Chairman
(717) 787-4804
Will T. Ketner
Secretary
(717) 783-1740

Public Utilities Commission
169 Weybosset Street
Providence, **Rhode Island** 02903
William Harsch
Chairman and Public Utilities Administrator
(401) 277-2444

Public Service Commission
P.O. Drawer 11649
Columbia, **South Carolina** 29211
Abney A. Smith
Chairman
(803) 758-3686
J. H. Still
Director of Administrative Service
(803) 758-3565

Public Utility Commission
State Capitol
Pierre, **South Dakota** 57501
Jack Weiland
Chairman
(605) 224-3204
Joe Norton
Executive Secretary
(605) 224-3202

Solid Fuels

National Coal Association
1130 M Street, N.W.
Washington, D.C. 20036
Telephone: (202) 627-4322

Liquid Fuels

American Petroleum Institute
1801 K Street, N.W.
Washington, D.C. 20006
Telephone: (202) 833-5600

American Petroleum Refiners Association
1110 Ring Building
Washington, D.C. 20036
Telephone: (202) 338-6181

National Petroleum Refiners Association
1725 De Sales Street, N. W.
Washington, D.C. 20036
Telephone: (202) 638-3722

Independent Refiners Association of America
1801 K Street, N.W.
Washington, D.C. 20006
Telephone: (202) 466-2340

Independent Petroleum Association of America
1101 16th Street, N.W.
Washington, D.C. 20036
Telephone: (202) 466-8240

Independent Gasoline Marketers Council
1523 L Street, N.W.
Washington, D.C. 20005
Telephone: (202) 467-5820

Major Trade Associations (Gas Intensive Industries)

SIC Code	
29	American Petroleum Institute 1801 K Street, N.W. Washington, D.C. 20006
28	Manufacturing Chemists Association 1825 Connecticut Avenue, N.W. Washington, D.C. 20009
3241	Portland Cement Association Old Orchard Road Skokie, Illinois 60076
26	American Paper Institute 260 Madison Avenue New York, New York 10016
3221	Glass Containers Manufacturers Association 1800 K Street, N.W. Washington, D.C. 20006
333	Aluminum Association 750 Third Avenue New York, New York 10017
332	American Iron and Steel Institute 1000 Sixteenth Street, N.W. Washington, D.C. 20036
333	Copper & Brass Fabricators Council 1015 Eighteenth Street, N.W. Washington, D.C. 20036
—	American Mining Congress Suite 1100 Ring Building 18th and M Streets, N.W. Washington, D.C. 20036
201	American Meat Institute 1600 Wilson Boulevard Arlington, Virginia 22209
201	National Independent Meat Packers Association 734 Fifteenth Street, N.W. Washington, D.C. 20005
205	American Baking Association 1700 Pennsylvania Avenue, N.W. Washington, D.C. 20006
205	Biscuit and Cracker Manufacturing Association 1660 L Street, N.W. Washington, D.C. 20036
3228	Battelle Institute (Pressed & Blown Glass) Columbus Laboratories 505 King Avenue Columbus, Ohio 43201
3211	Stewart & Ikenson (Flat Glass) Attorneys at Law 1001 Connecticut Avenue, N.W. Washington, D.C. 20036

Section 4

The Gas Industry, Alternate Resources and Industrial Users

Purpose:

The information contained in this section shall provide some guidance to staff members moving into location to enable them to:

- Assess rapidly the potential supply situation for natural gas and/or alternate energy sources within a State.
- Help develop an understanding of the socio-economic effects of a shortfall, particularly in the industrial sector.

It is realized that the data presented here can at best provide some very general background and that in many cases even referral back to the more complete main files may not be adequate to assess a local situation.

In the present form, information at State level is restricted to the 10 most critical States which would be most seriously affected in the event of curtailments.

Contents

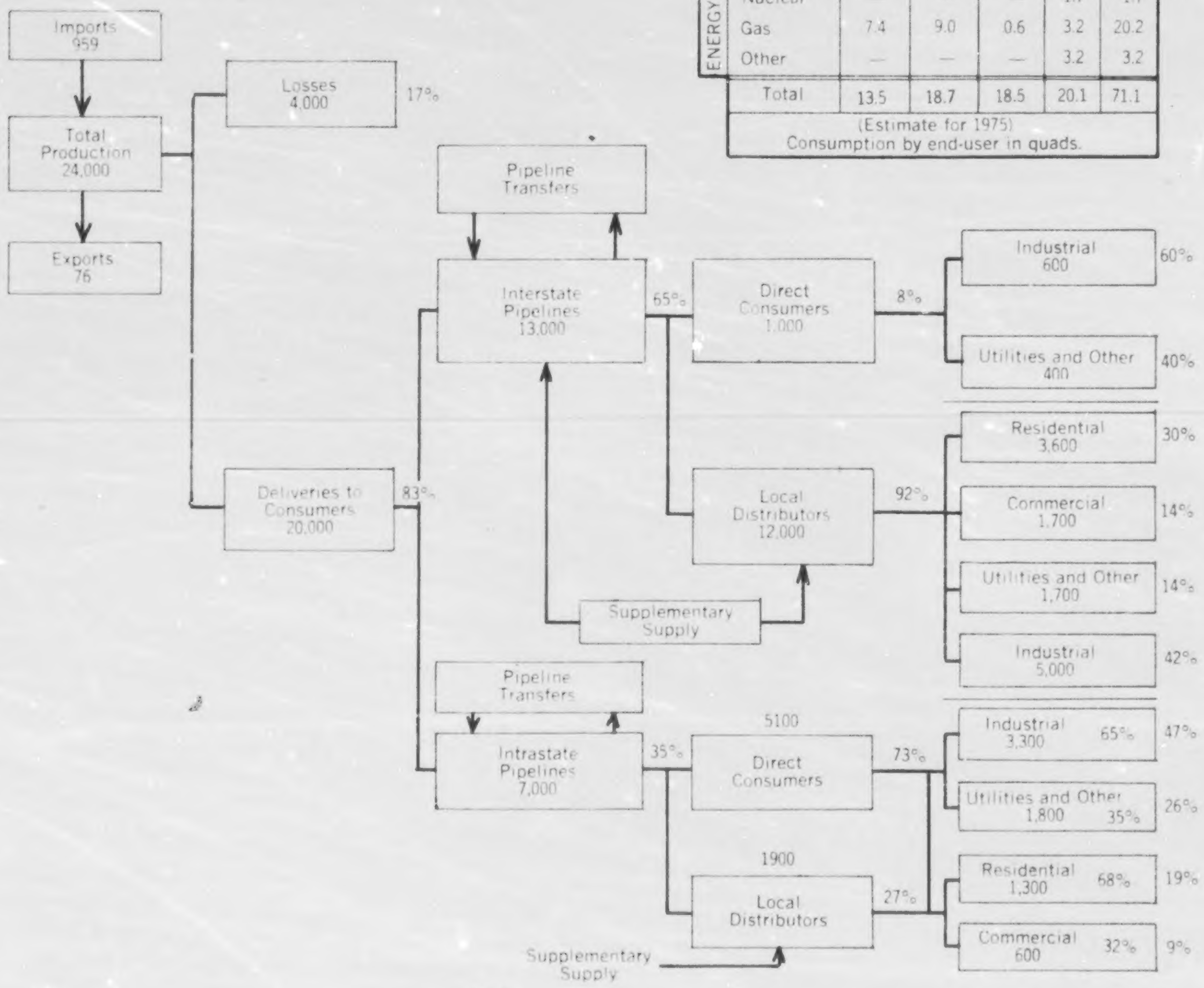
This section will provide, in concise form, data which will permit answering questions of the following nature:

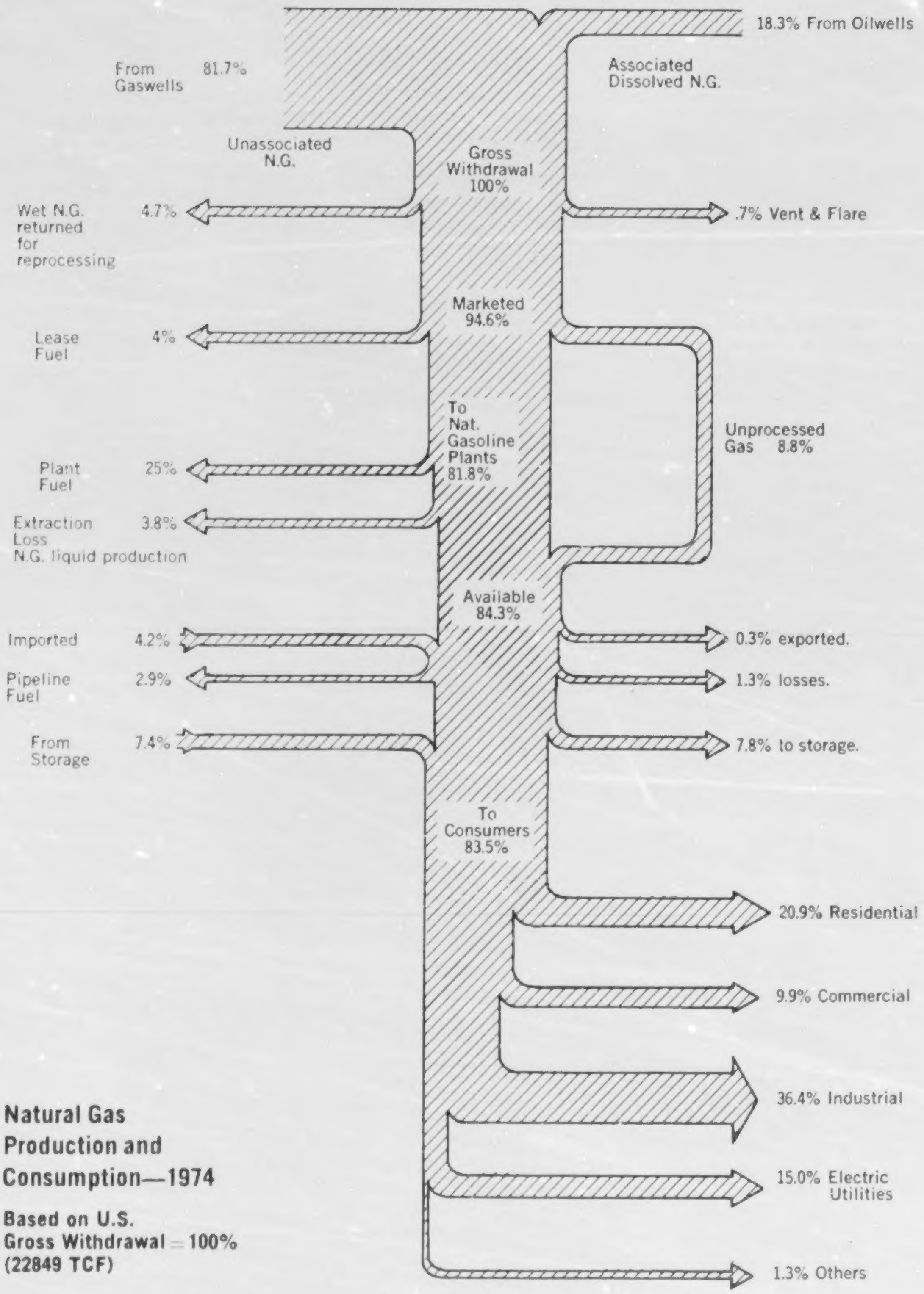
- United States fuel consumption data.
- United States natural gas distribution system.
- United States natural gas production and consumption.
- The main elements of a natural gas pipeline system.
- Gas utility industry miles of pipeline and main.
- Gas utility industry sales by class of service and firm and interruptible customers.
- Main line natural gas sales to industrial end-users.
- Industrial consumers of natural gas by SIC code.
- Main line sales directly to industrial end-users for some critical States.
- Overall fuel consumption for some critical States.

		USER SECTOR				
		Res Comm	Industry	Transportation	Elec. Util.	Total
ENERGY SOURCE	Coal	0.3	4.3	—	8.8	13.4
	Petroleum	5.8	5.6	17.9	3.3	32.7
	Nuclear	—	—	—	1.7	1.7
	Gas	7.4	9.0	0.6	3.2	20.2
	Other	—	—	—	3.2	3.2
	Total	13.5	18.7	18.5	20.1	71.1

(Estimate for 1975)
Consumption by end-user in quads.

Overview of U.S. Natural Gas System in BCF and % (1971)

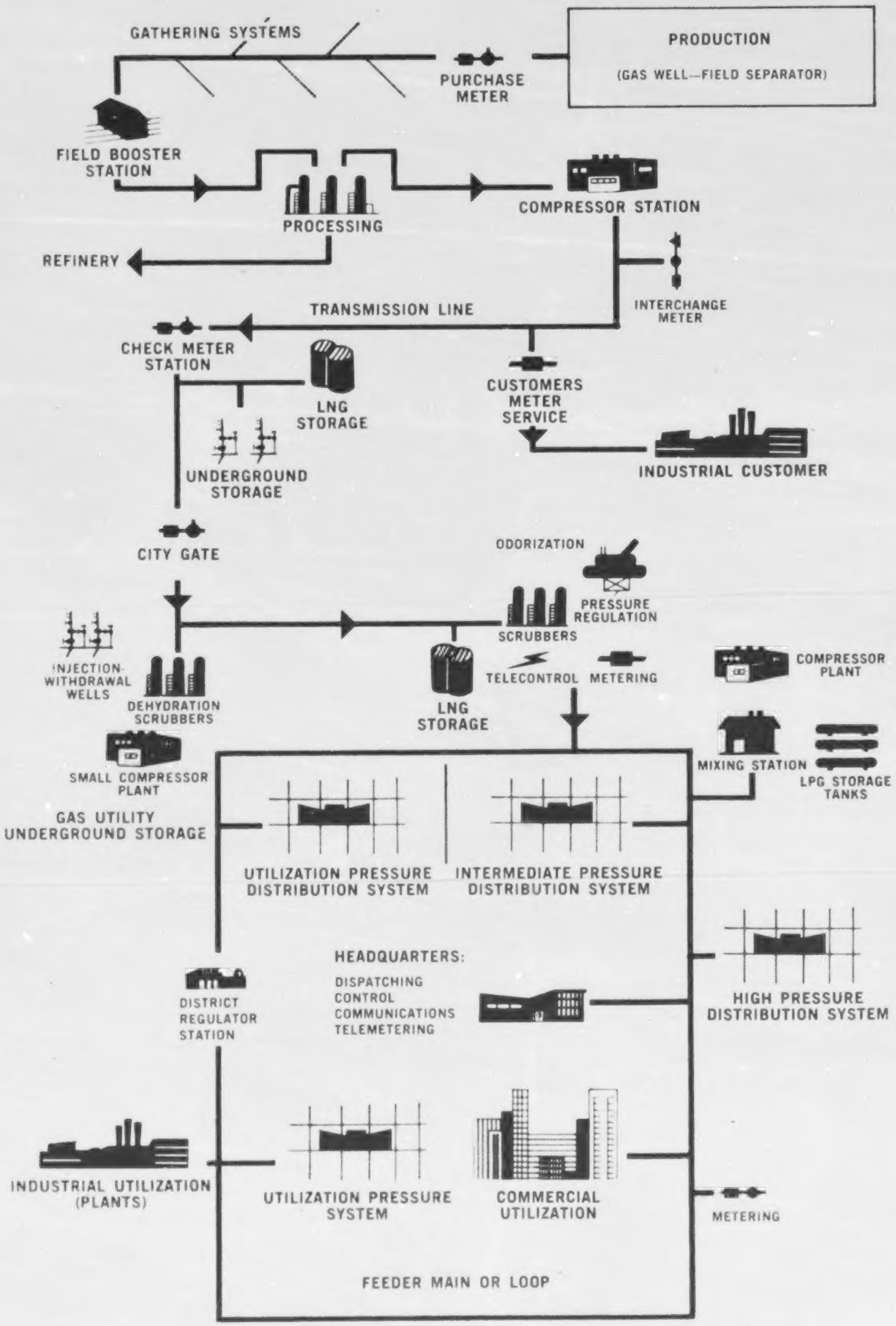

Imports 959
Losses 4,000
17%
Total Production 24,000
Exports 76
Pipeline Transfers
Interstate Pipelines 13,000
65%
Direct Consumers 1,000
8%
Industrial 600
60%
Utilities and Other 400
40%
Deliveries to Consumers 20,000
83%
Local Distributors 12,000
92%
Residential 3,600
30%
Commercial 1,700
14%
Utilities and Other 1,700
14%
Industrial 5,000
42%
Supplementary Supply
Pipeline Transfers
Intrastate Pipelines 7,000
35%
5100
Direct Consumers
73%
Industrial 3,300
65%
47%
Utilities and Other 1,800
35%
26%
1900
Local Distributors
27%
Residential 1,300
68%
19%
Commercial 600
32%
9%
Supplementary Supply


18.3% From Oilwells
From Gaswells 81.7%
Associated Dissolved N.G.
Unassociated N.G.
Gross Withdrawal 100%
Wet N.G. returned for reprocessing 4.7%
.7% Vent & Flare
Marketed 94.6%
Lease Fuel 4%
To Nat. Gasoline Plants 81.8%
Unprocessed Gas 8.8%
Plant Fuel 25%
Extraction Loss N.G. liquid production 3.8%
Available 84.3%
Imported 4.2%
0.3% exported.
Pipeline Fuel 2.9%
1.3% losses.
From Storage 7.4%
7.8% to storage.
To Consumers 83.5%
20.9% Residential
9.9% Commercial
36.4% Industrial
15.0% Electric Utilities
1.3% Others

Natural Gas Production and Consumption—1974

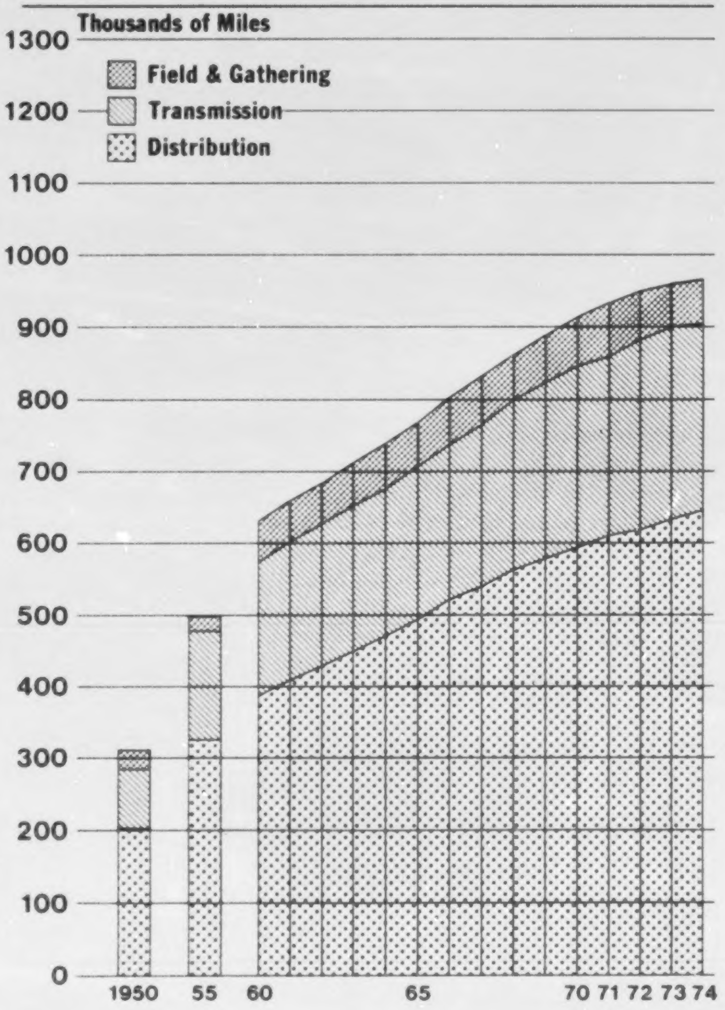
Based on U.S. Gross Withdrawal = 100% (22849 TCF)

Typical Gas Pipe Line System


GATHERING SYSTEMS
PRODUCTION
(GAS WELL—FIELD SEPARATOR)
PURCHASE METER
FIELD BOOSTER STATION
PROCESSING
COMPRESSOR STATION
REFINERY
INTERCHANGE METER
TRANSMISSION LINE
CHECK METER STATION
LNG STORAGE
CUSTOMERS METER SERVICE
UNDERGROUND STORAGE
INDUSTRIAL CUSTOMER
CITY GATE
ODORIZATION
PRESSURE REGULATION
SCRUBBERS
INJECTION-WITHDRAWAL WELLS
DEHYDRATION SCRUBBERS
LNG STORAGE
TELECONTROL
METERING
COMPRESSOR PLANT
SMALL COMPRESSOR PLANT
MIXING STATION
LPG STORAGE TANKS
GAS UTILITY UNDERGROUND STORAGE
UTILIZATION PRESSURE DISTRIBUTION SYSTEM
INTERMEDIATE PRESSURE DISTRIBUTION SYSTEM
HIGH PRESSURE DISTRIBUTION SYSTEM
HEADQUARTERS:
DISPATCHING
CONTROL
COMMUNICATIONS
TELEMETERING
DISTRICT REGULATOR STATION
INDUSTRIAL UTILIZATION (PLANTS)
UTILIZATION PRESSURE SYSTEM
COMMERCIAL UTILIZATION
METERING
FEEDER MAIN OR LOOP

4.4

GAS UTILITY INDUSTRY MILES OF PIPELINE AND MAIN



* Source—Gas Facts 1974

Gas Utility Industry Miles of Pipeline and Main, by Type and by State, 1974

Division and State	Total	Field and Gathering	Transmission Pipeline[b]	Distribution Main
United States	**976,676**	**67,024**	**263,492**	**646,160**
New England	**26,745**	**0**	**1,669**	**25,076**
Connecticut	5,966	0	486	5,480
Maine	461	0	80	381
Massachusetts	16,388	0	789	15,599
New Hampshire	1,154	0	201	953
Rhode Island	2,396	0	53	2,343
Vermont	380	0	60	320
Middle Atlantic	**114,266**	**5,996**	**17,832**	**90,438**
New Jersey	22,053	0	1,304	20,749
New York	40,279	155	4,509	35,615
Pennsylvania	51,934	5,841	12,019	34,074
East North Central	**188,932**	**3,819**	**35,817**	**149,296**
Illinois	49,955	110	9,963	39,882
Indiana	26,970	266	5,801	20,903
Michigan	39,834	191	6,442	33,201
Ohio	51,261	3,252	10,339	37,670
Wisconsin	20,912	0	3,272	17,640
West North Central	**107,747**	**7,430**	**40,094**	**60,223**
Iowa	17,080	16	6,133	10,931
Kansas	35,964	7,344	16,251	12,369
Minnesota	15,754	0	4,101	11,653
Missouri	20,484	29	4,112	16,343
Nebraska	13,477	24	7,442	6,011
North Dakota	2,518	17	1,113	1,388
South Dakota	2,470	0	942	1,528
South Atlantic	**99,375**	**8,350**	**21,908**	**69,117**
Delaware	1,288	0	228	1,060
District of Columbia	1,167	0	23	1,144
Florida	12,586	0	2,974	9,612
Georgia	22,264	11	4,931	17,322
Maryland	8,511	27	725	7,759
North Carolina	11,441	0	2,307	9,134
South Carolina	9,590	0	2,338	7,252
Virginia	10,938	40	2,406	8,492
West Virginia	21,590	8,272	5,976	7,342
East South Central	**70,065**	**3,724**	**26,857**	**39,484**
Alabama	17,826	20	5,509	12,297
Kentucky	19,735	3,528	6,932	9,275
Mississippi	16,990	176	9,298	7,516
Tennessee	15,514	0	5,118	10,396
West South Central	**194,614**	**23,815**	**82,117**	**88,682**
Arkansas	17,250	762	6,578	9,910
Louisiana	39,849	2,761	21,889	15,199
Oklahoma	31,835	7,951	10,824	13,060
Texas	105,680	12,341	42,826	50,513
Mountain	**82,830**	**13,078**	**26,929**	**42,823**
Arizona	15,137	2	5,041	10,094
Colorado	19,399	1,656	6,385	11,358
Idaho	3,723	0	1,150	2,573
Montana	7,212	1,569	2,925	2,718
Nevada	2,808	0	1,179	1,629
New Mexico	21,262	8,101	5,824	7,337
Utah	6,408	464	901	5,043
Wyoming	6,881	1,286	3,524	2,071
Pacific	**92,102**	**812**	**10,269**	**81,021**
Alaska	739	0	140	599
California	71,378	812	7,254	63,312
Hawaii	578	0	0	578
Oregon	8,774	0	1,163	7,611
Washington	10,633	0	1,712	8,921

[a] Excludes service pipe. Data not adjusted to common diameter equivalent. Mileage shown as of end of year.
[b] Includes 4,886 miles of underground storage pipe.

* Source—Gas Facts 1974

Selected Operating Statistics of Major Transmission Systems

Name of Transmission System	Compressor Stations		Miles of Transmission Pipeline				1974	
	No. of Transmission Stations	Installed Horse-power	Total	10" & Under Diameter	10.1"–20.0" Diameter	20.1" & Over Diameter	Peak Day Sendout (MMCF)	Operating Revenues (000,000)
Algonquin Gas Transmission Co.	3	30,900	909	281	138	490	698	$ 178.1
Cities Service Gas Co.	35	225,510	5,307	1,420	2,476	1,411	2,157	216.5
Colorado Interstate Gas Co.	14	126,780	2,425	410	1,217	798	1,199	172.1
Columbia Gas Transmission Co.	84	349,822	10,098	3,484	4,925	1,689	7,275	941.7
Columbia Gulf Transmission Co.	16	467,470	3,520	124	341	3,055	1,815	125.3
Consolidated Gas Supply Corp.	45	117,247	3,619	526	2,413	680	4,029	541.3
East Tennessee Natural Gas Co.	10	20,520	1,012	447	383	182	349	54.6
El Paso Natural Gas Co.	80	804,588	9,493	1,806	2,690	4,997	3,747	829.4
Florida Gas Transmission Co.	20	144,070	4,266	1,385	891	1,990	805	104.3
Michigan Wisconsin Pipeline Co.	37	753,060	7,578	1,328	700	5,550	4,420	531.9
Midwestern Gas Transmission Co.	14	94,560	903	55	0	848	1,012	170.9
Mississippi River Transmission Co.	18	104,125	1,760	203	206	1,351	997	141.5
Natural Gas Pipeline Co. Of America	52	938,105	9,655	811	980	7,864	4,552	590.7
Northern Natural Gas Co.	60	920,532	18,747	11,017	3,182	4,548	3,111	556.7
Pacific Gas Transmission Co.	12	235,620	639	0	0	639	1,292	227.4
Panhandle Eastern Pipeline Co.	54	615,560	6,692	729	1,345	4,618	2,157	379.4
South Georgia Natural Gas Co.	2	3,500	769	563	206	0	104	17.2
Southern Natural Gas Co.	36	354,726	6,734	990	3,601	2,143	2,141	379.4
Tenneco, Inc.	60	1,230,475	13,087	1,281	1,713	10,093	4,665	745.1
Texas Eastern Transmission Corp.	75	1,176,110	8,833	871	1,608	6,354	3,447	569.3
Texas Gas Transmission Corp.	19	459,010	5,520	1,185	1,440	2,895	2,502	346.1
Transcontinental Gas Pipeline Corp.	6	951,185	8,778	755	1,440	6,583	3,905	520.3
Transwestern Pipeline Co.	126	207,109	3,295	1,312	430	1,553	995	172.7
Trunkline Gas Co.	19	332,000	3,679	6	544	3,129	1,188	208.5
United Gas Pipeline Co.	31	189,305	7,338	2,401	3,044	1,893	4,124	453.4

a. Includes transmission systems with more than 500 miles of transmission pipeline and $5,000,000 operating revenues.
Source: Federal Power Commission.

Marketed Production and Interstate Shipments of Natural Gas, 1974

(Millions of cubic feet)

Division and State	Marketed Production	Interstate Movements	
		Receipts[a]	Deliveries[b]
United States	**21,600,522**	**$53,880,441**	**$52,997,946**
New England	**0**	**459,740**	**198,708**
Connecticut	0	160,854	94,299
Maine	0	17,260[c]	1,934[c]
Massachusetts	0	182,472	26,779
New Hampshire	0	d	d
Rhode Island	0	99,154	75,696
Vermont	0	d	d
Middle Atlantic	**87,627**	**3,365,768**	**1,864,639**
New Jersey	0	700,511	426,406
New York	4,990	888,738	256,725
Pennsylvania	82,637	1,776,519	1,181,508
East North Central	**162,800**	**8,293,968**	**4,314,225**
Illinois	1,436	2,213,790	991,334
Indiana	176	1,967,486	1,435,665
Michigan	69,133	869,059	13,232
Ohio	92,055	2,778,124	1,794,255
Wisconsin	0	465,509	79,739
West North Central	**920,559**	**7,083,498**	**5,905,510**
Iowa	0	1,379,323	995,699
Kansas	886,782	2,100,454	2,345,003
Minnesota	0	577,358	223,040
Missouri	33	1,603,047	1,184,299
Nebraska	2,538	1,373,156	1,149,267
North Dakota	31,206	16,053	6,301
South Dakota	0	34,107	1,901
South Atlantic	**247,672**	**6,045,450**	**4,813,329**
Delaware	0	22,193	1,457
District of Columbia	0	e	e
Florida	38,137	255,493	0
Georgia	0	1,227,583	892,111
Maryland	133	752,816[f]	548,930[f]
North Carolina	0	732,669	589,735
South Carolina	0	869,771	732,669
Virginia	7,096	889,360	747,850
West Virginia	202,306	1,295,565	1,300,577
East South Central	**178,545**	**16,973,394**	**16,079,591**
Alabama	27,865	2,927,510	2,673,216
Kentucky	71,876	3,854,479	3,684,235
Mississippi	78,787	6,064,296	5,858,875
Tennessee	17	4,127,109	3,863,265
West South Central	**17,687,346**	**5,382,538**	**14,882,174**
Arkansas	123,975	2,421,412	2,249,394
Louisiana	7,753,631	972,873	6,499,158
Oklahoma	1,638,942	1,451,639	2,367,371
Texas	8,170,798	536,614	3,766,251
Mountain	**1,821,684**	**3,548,935**	**4,051,655**
Arizona	224	1,491,149	1,295,365
Colorado	144,629	295,181	118,486
Idaho	0	506,879	453,673
Montana	54,873	71,045	25,214
Nevada	0	64,593	0
New Mexico	1,244,779	784,918	1,700,380
Utah	50,552	238,164	161,740
Wyoming	326,657	97,006	296,797
Pacific	**494,289**	**2,727,150**	**888,115**
Alaska	128,935	0	50,258
California	365,354	1,598,378	0
Hawaii	0	0	0
Oregon	0	464,072	359,991
Washington	0	664,700	477,866

[a] Includes receipts from Canada of 405,489 million cubic feet into Idaho, 238,905 million cubic feet into Washington; 256,100 million cubic feet into Minnesota, 48,111 million cubic feet into Montana, 5,556 million cubic feet into New York; 4,891 million cubic feet into Vermont; and from Mexico 222 million cubic feet into Texas.

[b] Includes deliveries into Canada of 13,232 million cubic feet from Michigan; 31 million cubic feet from Montana; and into Mexico 9,051 million cubic feet from Texas; and 4,217 million cubic feet from Arizona. LNG exports of 50,258 million cubic feet from Alaska to Japan.

[c] Includes New Hampshire and Vermont.

[d] Included in Maine.

[e] Included in Maryland.

[f] Includes District of Columbia.

Source: U.S. Bureau of Mines, *Natural Gas Annual*, 1974.

Gas Utility Industry Sales by State and Class of Service, 1974 *

(Trillions of Btu)

Division and State	Total	Class of Service: Residential	Commercial	Industrial	Other	Average Btu Value
United States	**16,000.3**	**4,864.8**	**2,293.4**	**8,153.2**	**689.0**	**1,024**
New England	**267.5**	**138.5**	**59.4**	**59.9**	**9.7**	**1,010**
Connecticut	65.7	32.1	15.7	17.9	0.0	1,012
Maine	1.8	0.7	0.5	0.5	0.1	1,011
Massachusetts	163.3	87.4	36.9	30.7	8.4	1,009
New Hampshire	9.2	4.2	1.9	2.3	0.8	1,007
Rhode Island	24.0	12.8	4.0	6.9	0.3	1,013
Vermont	3.6	1.4	0.5	1.7	0.0	1,008
Middle Atlantic	**1,644.2**	**787.0**	**284.6**	**541.8**	**30.9**	**1,024**
New Jersey	278.8	143.9	60.6	72.2	2.1	1,026
New York	606.8	346.7	116.1	125.6	18.4	1,023
Pennsylvania	758.6	296.4	107.8	344.0	10.4	1,024
East North Central	**4,031.8**	**1,555.7**	**741.1**	**1,686.5**	**48.4**	**1,017**
Illinois	1,126.6	472.8	222.3	428.2	3.3	1,023
Indiana	497.0	155.4	72.9	267.0	1.7	997
Michigan	932.0	354.5	204.2	365.9	7.4	1,007
Ohio	1,090.4	452.9	186.0	433.2	18.2	1,026
Wisconsin	385.8	120.1	55.6	192.2	17.9	1,015
West North Central	**1,734.5**	**508.1**	**276.9**	**898.4**	**51.1**	**1,001**
Iowa	314.5	92.0	55.9	148.3	18.3	1,011
Kansas	479.4	90.2	42.7	338.2	8.3	986
Minnesota	321.8	106.1	46.2	162.8	6.6	1,001
Missouri	366.2	147.6	76.0	131.5	11.1	1,005
Nebraska	196.3	51.1	35.4	103.3	6.5	1,002
North Dakota	24.3	9.7	11.2	3.2	0.2	1,002
South Dakota	32.0	11.4	9.4	11.1	0.1	999
South Atlantic	**1,267.9**	**332.5**	**185.9**	**703.0**	**46.5**	**1,025**
Delaware	22.5	7.6	3.1	10.2	1.6	1,020
District of Columbia	26.0	13.3	10.6	0.1	2.0	1,012
Florida	151.0	14.9	23.1	94.7	18.3	1,043
Georgia	320.9	75.9	39.1	203.8	2.2	1,028
Maryland	158.4	70.6	24.8	59.5	3.5	1,020
North Carolina	140.3	27.6	18.0	91.6	3.1	1,025
South Carolina	146.3	19.1	14.2	105.4	7.5	1,025
Virginia	137.7	47.9	28.5	54.9	6.3	1,022
West Virginia	164.8	55.6	24.4	82.8	2.0	1,023
East South Central	**858.9**	**203.7**	**111.8**	**520.2**	**23.2**	**1,022**
Alabama	252.9	50.9	25.4	176.3	0.4	1,028
Kentucky	196.0	79.6	35.1	74.3	7.0	1,015
Mississippi	167.0	28.4	15.0	112.6	11.0	1,025
Tennessee	243.0	44.9	36.2	157.1	4.8	1,020
West South Central	**3,198.6**	**417.2**	**204.7**	**2,292.9**	**283.8**	**1,027**
Arkansas	248.5	44.2	27.7	174.8	1.8	999
Louisiana	527.7	67.6	24.4	420.5	15.2	1,030
Oklahoma	391.3	72.6	40.7	146.2	131.7	1,032
Texas	2,031.1	232.7	111.8	1,551.5	135.1	1,027
Mountain	**984.0**	**252.6**	**157.7**	**548.4**	**25.3**	**1,036**
Arizona	168.1	35.0	22.7	105.7	4.8	1,065
Colorado	288.7	89.9	64.3	132.8	1.7	967
Idaho	50.9	9.7	7.8	33.5	0.0	1,042
Montana	78.7	23.8	15.7	36.1	3.1	1,022
Nevada	65.4	9.3	9.3	46.1	0.8	1,067
New Mexico	140.4	28.9	14.5	84.2	12.9	1,062
Utah	119.1	43.4	14.7	61.0	0.0	952
Wyoming	72.7	12.9	8.8	49.0	2.0	996
Pacific	**2,012.8**	**669.4**	**271.3**	**902.0**	**170.0**	**1,052**
Alaska	27.2	4.5	5.3	11.7	5.7	1,005
California	1,706.1	604.5	218.0	719.6	164.0	1,056
Hawaii	3.4	0.9	0.8	1.8	0.0	921
Oregon	95.4	22.8	14.0	58.5	0.0	1,044
Washington	180.7	36.7	33.2	110.4	0.3	1,047

* Source—Gas Facts 1974

4.6

Gas Utility Industry Firm and Interruptible Gas Sales by State, 1974 *

(Trillions of Btu)

Division and State	Commercial: Total	Commercial: Firm	Commercial: Interruptible	Industrial: Total	Industrial: Firm	Industrial: Interruptible
United States	**2,293.4**	**2,163.1**	**130.3**	**8,153.2**	**4,718.3**	**3,434.9**
New England	**59.4**	**57.9**	**1.4**	**59.9**	**37.0**	**22.8**
Connecticut	15.7	15.4	0.3	17.9	15.6	2.3
Maine	0.5	0.5	0.0	0.5	0.4	0.1
Massachusetts	36.9	35.7	1.1	30.7	15.9	14.7
New Hampshire	1.9	1.9	0.0	2.3	1.1	1.2
Rhode Island	4.0	3.9	0.1	6.9	3.9	3.0
Vermont	0.5	0.5	0.0	1.7	0.2	1.5
Middle Atlantic	**284.6**	**279.1**	**5.5**	**541.8**	**450.0**	**91.8**
New Jersey	60.6	56.0	4.7	72.2	38.0	34.2
New York	116.1	115.4	0.7	125.6	98.9	26.7
Pennsylvania	107.8	107.7	0.1	344.0	313.1	30.9
East North Central	**741.1**	**719.6**	**21.5**	**1,686.5**	**1,313.4**	**373.1**
Illinois	222.3	219.4	2.9	428.2	364.9	63.3
Indiana	72.9	69.1	3.8	267.0	231.3	35.7
Michigan	204.2	199.3	4.9	365.9	276.0	89.9
Ohio	186.0	184.2	1.8	433.2	393.4	39.8
Wisconsin	55.6	47.6	8.0	192.2	47.8	144.4
West North Central	**276.9**	**241.5**	**35.3**	**898.4**	**309.6**	**588.8**
Iowa	55.9	42.0	14.0	148.3	72.4	75.9
Kansas	42.7	40.4	2.3	338.2	92.9	245.3
Minnesota	46.2	43.5	2.7	162.8	54.5	108.4
Missouri	76.0	65.9	10.1	131.5	56.7	74.8
Nebraska	35.4	31.0	4.4	103.3	33.0	70.3
North Dakota	11.2	11.2	0.0	3.2	0.0	3.2
South Dakota	9.4	7.6	1.8	11.1	0.2	10.8
South Atlantic	**185.9**	**171.2**	**14.7**	**703.0**	**264.9**	**438.1**
Delaware	3.1	3.1	0.0	10.2	8.6	1.6
District of Columbia	10.6	8.9	1.7	0.1	0.0	0.1
Florida	23.1	22.2	1.0	94.7	26.7	68.0
Georgia	39.1	38.6	0.5	203.8	24.5	179.3
Maryland	24.8	20.5	4.3	59.5	33.2	26.2
North Carolina	18.0	18.0	0.0	91.6	32.9	58.6
South Carolina	14.2	10.8	3.4	105.4	22.0	83.4
Virginia	28.5	24.8	3.7	54.9	35.6	19.3
West Virginia	24.4	24.4	0.0	82.8	81.3	1.5
East South Central	**111.8**	**105.2**	**6.5**	**520.2**	**343.8**	**176.4**
Alabama	25.4	25.3	0.1	176.3	127.7	48.6
Kentucky	35.1	32.1	3.0	74.3	37.4	36.9
Mississippi	15.0	15.0	0.0	112.6	92.9	19.7
Tennessee	36.2	32.8	3.4	157.1	85.8	71.3
West South Central	**204.7**	**200.3**	**4.4**	**2,292.9**	**1,623.8**	**669.2**
Arkansas	27.7	27.7	0.0	174.8	157.7	17.1
Louisiana	24.4	24.1	0.3	420.5	402.7	17.8
Oklahoma	40.7	39.6	1.1	146.2	46.1	100.2
Texas	111.8	108.9	2.9	1,551.5	1,017.3	534.2
Mountain	**157.7**	**156.6**	**1.1**	**548.4**	**217.2**	**331.2**
Arizona	22.7	22.7	0.0	105.7	105.5	0.1
Colorado	64.3	63.8	0.5	132.8	30.6	102.2
Idaho	7.8	7.8	0.0	33.5	22.8	10.7
Montana	15.7	15.7	0.0	36.1	2.5	33.6
Nevada	9.3	9.3	0.0	46.1	17.3	28.8
New Mexico	14.5	13.9	0.6	84.2	16.9	67.3
Utah	14.7	14.7	0.0	61.0	5.1	55.9
Wyoming	8.8	8.8	0.0	49.0	16.5	32.6
Pacific	**271.3**	**231.5**	**39.8**	**902.0**	**158.5**	**743.5**
Alaska	5.3	4.3	1.0	11.7	11.6	0.1
California	218.0	190.8	27.2	719.6	79.5	640.2
Hawaii	0.8	0.8	0.0	1.8	1.8	0.0
Oregon	14.0	13.5	0.5	58.5	30.5	28.0
Washington	33.2	22.1	11.1	110.4	35.2	75.2

* Source—Gas Facts 1974

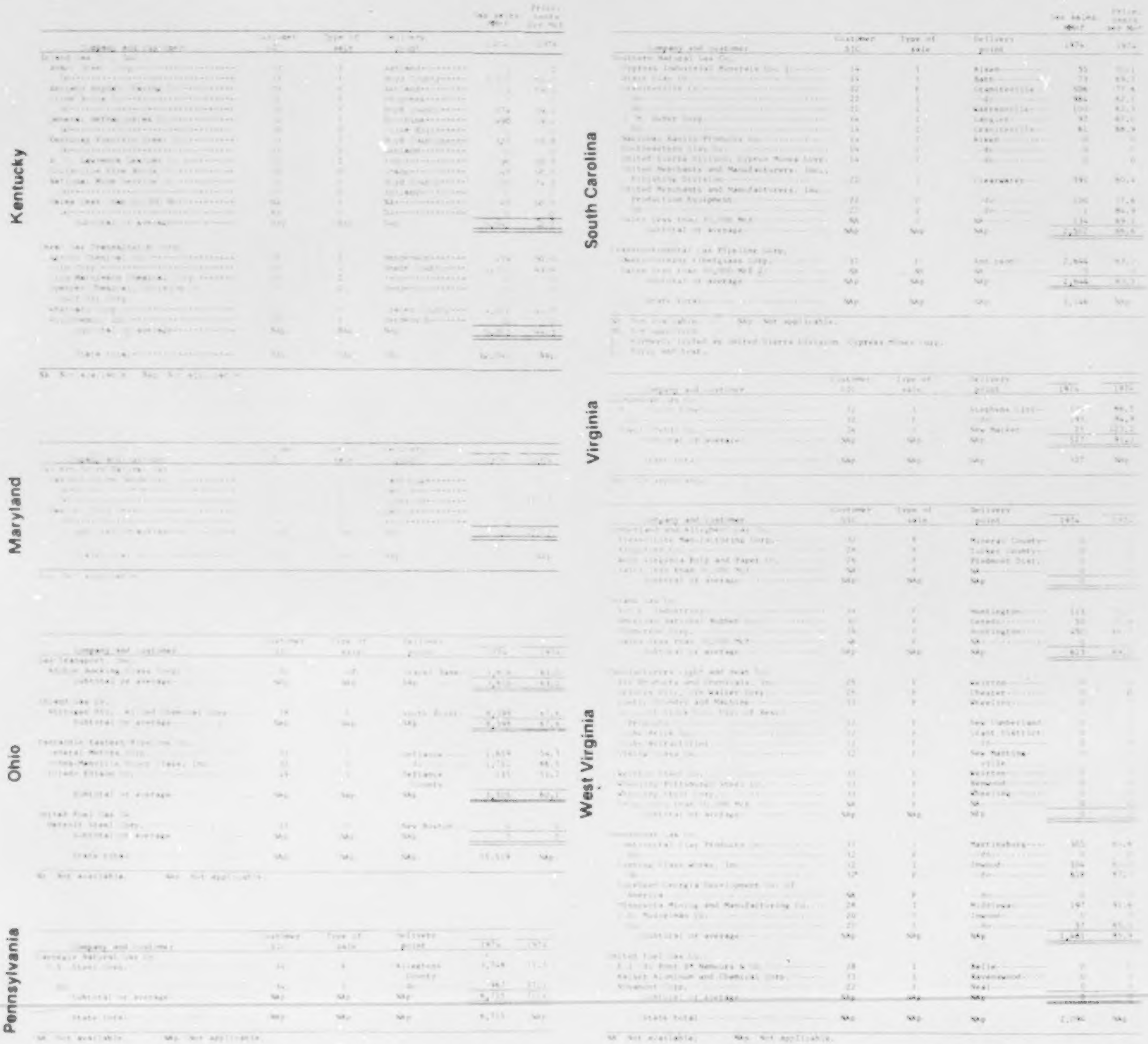
Summary of Main Line Natural Gas Sales to Industrial Users, by Type of Sale—1974, MMcf

State	Firm (1)	Offpeak (2)	Interruptible (3)	Not specified (4)	Total (5)
Alabama	55,099	0	24,344	0	79,443
Arizona	65,118	0	0	0	65,118
Arkansas	131,583	0	5,206	0	136,789
Colorado	114	0	1,304	53,039	54,457
Delaware	3,432	0	52	0	3,484
Florida	25,124	0	47,452	10	72,586
Georgia	3,538	0	14,920	0	18,458
Illinois	25,303	0	22,932	0	48,235
Indiana	0	0	1,967	0	1,967
Iowa	8,216	0	3,465	0	11,681
Kansas	30,342	0	96,960	27,777	155,079
Kentucky	10,760	0	2,088	0	12,848
Louisiana	137,851	0	131	479	138,461
Maryland	0	0	56	0	56
Michigan	10,603	0	2,217	0	12,820
Minnesota	32,182	0	9,549	0	41,731
Mississippi	61,797	0	4,020	7,463	73,280
Missouri	8,257	0	22,331	259	30,847
Montana	0	0	2,858	1,687	4,545
Nebraska	23,608	0	24,594	0	48,202
Nevada	40,506	0	0	0	40,506
New Hampshire	121	0	261	0	382
New Jersey	0	0	0	0	0
New Mexico	13,836	0	476	0	14,312
North Carolina	0	0	0	0	0
North Dakota	0	0	1,042	0	1,042
Ohio	8,398	3,616	3,505	0	15,519
Oklahoma	5,551	0	15,832	191	21,574
Pennsylvania	5,748	0	967	0	6,715
South Carolina	3,250	0	1,896	0	5,146
South Dakota	5	0	4,615	0	4,620
Tennessee	24,182	0	14,200	341	38,723
Texas	33,929	0	135,835	0	169,764
Virginia	218	0	309	0	527
Washington	404	0	0	0	404
West Virginia	1,231	0	863	0	2,094
Wyoming	44	0	13,842	0	13,886
Total	770,350	3,616	480,089	91,246	1,345,301

Source: Data compiled from table 4.

* Source: Mineral Industry Surveys, Bureau of Mines, Dept. of Interior Dated March 2, 1976

Main Line Sales Directly to Industrial End Users for Some Critical States 1974 *


Kentucky
Maryland
Ohio
Pennsylvania
South Carolina
Virginia
West Virginia

*Source: Mineral Industry Surveys, Bureau of Mines, Dept. of Interior
Dated March 2, 1976

Salient Fuel Statistics—1972 Kentucky

KENTUCKY (Pop. 3,306,000)

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Reserves	0	25,340,550	48,193	46,782	938,082	0
Production:						
Quantity	0	121,181	9,702	W	63,648	0
Value, thousands	0	824,691	32,599	W	15,976	0

Average number of active operations - Coal mines: 1,438 Crude oil wells: 16,616 Natural gas wells: 7,099 Uranium mines: 0

Labor force - Total: 1,307,100 Fuel sector (excluding processing): 29,904

	Petroleum refineries		Natural gas processing plants		Uranium mills	
Processing plants:						
Number	4		2		0	
Daily capacity	161,300	bbl	925	MMcf	0	tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	319	11,229	121,194	0
Industrial	0	3,610	7,051	97,487	0
Transportation	0	0	46,658	36,950	0
Electric power	0	22,311	390	10,014	3,819
Miscellaneous	W	0	222	0	0
Total	W	26,240	65,550	265,645	3,819

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	8.7	59.5	125.0	0	193.2	55.7	248.9
Industrial	0	98.4	33.5	100.5	0	232.4	93.5	325.9
Transportation	0	0	248.8	38.1	0	286.9	0	286.9
Electric power	0	498.3	2.4	10.3	39.6	550.6	....	
Miscellaneous	W	0	1.3	0	0	1.3	....	1.3
Total	W	605.4	345.5	273.9	39.6	1,264.4	149.2	863.0
Percentages	-	47.9	27.3	21.7	3.1	100.0	....	....

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	25	0	6	31
Installed capacity (thousand kW)	9,662	0	686	10,348
Production (million kW-hr)	49,891	0	3,819	53,710

Total gross energy input: 1,264.4 trillion Btu

Total gross energy input per capita: 382 million Btu

Total net energy input: 863.0 trillion Btu

Total net energy input per capita: 261 million Btu

Salient Fuel Statistics—1972 Maryland and District of Columbia

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Reserves	0	1,048,210	0	0	W	0
Production:						
Quantity	0	1,640	0	0	244	0
Value, thousands	0	8,961	0	0	51	0

Average number of active operations - Coal mines: 55 Crude oil wells: 0 Natural gas wells: 16 Uranium mines: 0

Labor force - Total: 2,968,100 Fuel sector (excluding processing): 476

	Petroleum refineries		Natural gas processing plants		Uranium mills	
Processing plants:						
Number	2		0		0	
Daily capacity	25,000	bbl	0	MMcf	0	tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite 1/ (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	55	33,259	127,386	0
Industrial	0	4,593	10,027	74,575	0
Transportation	0	0	58,549	3,601	0
Electric power	0	5,705	28,845	7,043	2,284
Miscellaneous	75	0	575	0	0
Total	75	10,353	131,255	212,605	2,284

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite 1/	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	1.5	198.2	131.4	0	331.1	71.3	402.4
Industrial	0	125.2	61.3	76.9	0	263.4	46.3	309.7
Transportation	0	0	314.3	3.7	0	318.0	0.7	318.7
Electric power	0	127.4	180.3	7.2	23.7	338.6	...	...
Miscellaneous	1.9	0	3.4	0	0	5.3	...	5.3
Total	1.9	254.1	757.5	219.2	23.7	1,256.4	118.3	1,036.1
Percentages	0.2	20.2	60.3	17.4	1.9	100.0	...	...

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	31	0	3	34
Installed capacity (thousand kW)	7,271	0	497	7,768
Production (million kW-hr)	27,802	0	2,284	30,086

Total gross energy input: 1,256.4 trillion Btu
Total gross energy input per capita: 262 million Btu

Total net energy input: 1,036.1 trillion Btu
Total net energy input per capita: 216 million Btu

1/ Includes Delaware.

Salient Fuel Statistics—1972 New Jersey

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Reserves	0	0	0	0	0	0
Production:						
Quantity	0	0	0	0	0	0
Value, thousands	0	0	0	0	0	0

Average number of active operations - Coal mines: 0 Crude oil wells: 0 Natural gas wells: 0 Uranium mines: 0

Labor force - Total: 3,195,560 Fuel sector (excluding processing): 0

	Petroleum refineries		Natural gas processing plants		Uranium mills
Processing plants:					
Number	5		0		0
Daily capacity	594,000	bbl	0	MMcf	0 tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	2	76,026	210,038	0
Industrial	0	42	21,481	97,106	0
Transportation	0	0	101,475	729	4,132
Electric power	0	1,107	49,009	25,039	0
Miscellaneous	266	0	522	0	0
Total	266	1,151	248,513	332,912	4,132

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	0.1	451.9	216.5	0	668.5	97.6	766.1
Industrial	0	1.1	123.9	100.1	0	225.1	63.0	288.1
Transportation	0	0	551.4	.8	0	552.2	0	552.2
Electric power	0	24.7	304.5	25.8	44.1	399.1	...	...
Miscellaneous	6.8	0	3.1	0	0	9.9	...	9.9
Total	6.8	25.9	1,434.8	343.2	44.1	1,854.8	160.6	1,616.3
Percentages	0.4	1.4	77.3	18.5	2.4	100.0	...	...

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	41	1	2	44
Installed capacity (thousand kW)	9,984	550	341	10,875
Production (million kW-hr)	30,327	4,356	-224	34,459

Total gross energy input: 1,854.8 trillion Btu
Total gross energy input per capita: 252 million Btu

Total net energy input: 1,616.3 trillion Btu
Total net energy input per capita: 220 million Btu

Salient Fuel Statistics—1972 New York

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Reserves	0	0	9,246	0	139,184	0
Production:						
Quantity	0	0	1,018	0	3,679	0
Value, thousands	0	0	4,897	0	1,199	0

Average number of active operations - Coal mines: 0 Crude oil wells: 5,427 Natural gas wells: 650 Uranium mines: 0

Labor force - Total: 8,290,000 Fuel sector (excluding processing): 1,796

	Petroleum refineries		Natural gas processing plants		Uranium mills
Processing plants:					
Number	2		0		0
Daily capacity	102,600	bbl	0	MMcf	0 tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	51	169,965	491,559	0
Industrial	0	7,336	15,615	127,241	0
Transportation	0	0	219,320	3,401	0
Electric power	0	6,060	92,892	75,507	34,007
Miscellaneous	941	0	986	0	0
Total	941	13,447	498,778	697,708	34,007

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	1.4	1,014.1	506.8	0	1,522.3	234.9	1,757.2
Industrial	0	200.0	93.6	131.2	0	424.8	110.7	535.5
Transportation	0	0	1,185.7	3.5	0	1,189.2	10.3	1,199.5
Electric power	0	135.4	577.9	77.8	354.8	1,145.9	...	...
Miscellaneous	23.9	0	5.6	0	0	29.5	...	29.5
Total	23.9	336.8	2,876.9	719.3	354.8	4,311.7	355.9	3,521.7
Percentages	0.6	7.8	66.7	16.7	8.2	100.0		

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	84	3	119	206
Installed capacity (thousand kW)	18,981	1,434	3,974	24,389
Production (million kW-hr)	68,133	6,465	27,542	102,140

Total gross energy input: 4,311.7 trillion Btu
Total gross energy input per capita: 235 million Btu

Total net energy input: 3,521.7 trillion Btu
Total net energy input per capita: 192 million Btu

INT 3778-74

Salient Fuel Statistics—1972 North Carolina

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Reserves	0	Not available	0	0	0	0
Production:						
Quantity	0	0	0	0	0	0
Value, thousands	0	0	0	0	0	0

Average number of active operations - Coal mines: 0 Crude oil wells: 0 Natural gas wells: 0 Uranium mines: 0

Labor force - Total: 2,369,400 Fuel sector (excluding processing): 0

	Petroleum refineries		Natural gas processing plants		Uranium mills
Processing plants:					
Number	0		0		0
Daily capacity	0	bbl	0	MMcf	0 tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	370	30,071	51,151	0
Industrial	0	1,423	14,593	94,252	0
Transportation	0	0	73,743	6,071	0
Electric power	0	18,763	5,220	16,812	6,429
Miscellaneous	W	0	1,283	0	0
Total	W	20,556	124,910	168,286	6,429

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	10.1	171.6	52.7	0	234.4	100.6	335.0
Industrial	0	38.8	88.1	97.2	0	224.1	70.4	294.5
Transportation	0	0	390.9	6.3	0	397.2	0	397.2
Electric power	0	419.1	32.3	17.3	66.7	535.4	...	...
Miscellaneous	W	0	6.5	0	C	6.5	...	6.5
Total	W	468.0	689.4	173.5	66.7	1,397.6	171.0	1,033.2
Percentages	-	33.5	49.3	12.4	4.8	100.0	...	...

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	31	0	42	73
Installed capacity (thousand kW)	9,381	0	1,834	11,215
Production (million kW-hr)	51,162	0	6,429	57,591

Total gross energy input: 1,397.6 trillion Btu
Total gross energy input per capita: 268 million Btu

Total net energy input: 1,033.2 trillion Btu
Total net energy input per capita: 198 million Btu

INT. 5778-74

Salient Fuel Statistics—1972 Ohio

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Estimated recoverable reserves	0	21,077,150	127,385	0	1,146,677	0
Production:						
Quantity	0	50,967	9,358	0	89,995	0
Value, thousands	0	303,819	35,179	0	35,271	0

Average number of active operations - Coal mines: 306 Crude oil wells 15,222 Natural gas wells: 8,630 Uranium mines: 0

Labor force - Total 4,384,300 Fuel sector (excluding processing): 14,403

	Petroleum refineries		Natural gas processing plants		Uranium mills	
Processing plants:						
Number	7		0		0	
Daily capacity	517,300	bbl	0	MMcf	0	tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	1,236	35,120	667,050	0
Industrial	0	24,321	14,586	462,674	0
Transportation	0	0	140,058	12,726	0
Electric power	0	40,182	3,416	16,689	9
Miscellaneous	155	0	539	0	0
Total	155	65,739	193,719	1,159,139	9

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	33.7	201.4	687.7	0	922.8	162.9	1,085.7
Industrial	0	663.2	82.7	477.0	0	1,222.9	204.7	1,427.6
Transportation	0	0	745.9	13.2	0	759.1	0.1	759.2
Electric power	0	897.5	20.3	17.2	0.1	935.1	...	...
Miscellaneous	3.9	0	2.9	0	0	6.8	...	6.8
Total	3.9	1,594.4	1,053.2	1,195.1	0.1	3,846.7	367.7	3,279.3
Percentages	0.1	41.4	27.4	31.1	insig.	100.0	...	...

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	94	0	1	95
Installed capacity (thousand kW)	20,453	0	2	20,455
Production (million kW-hr)	92,553	0	9	92,562

Total gross energy input: 3,846.7 trillion Btu

Total gross energy input per capita: 359 million Btu

Total net energy input: 3,279.3 trillion Btu

Total net energy input per capita: 306 million Btu

Salient Fuel Statistics—1972 Pennsylvania

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Reserves	7,120,530	23,880,010	37,343	735	1,406,948	0
Production:						
Quantity	7,106	75,939	3,441	W	73,958	0
Value, thousands	85,251	694,267	15,414	W	22,389	0

Average number of active operations - Coal mines: 1,139 Crude oil wells: 32,596 Natural gas wells: 16,600 Uranium mines: 0

Labor force - Total: 5,117,100 Fuel sector (excluding processing): 26,736

	Petroleum refineries	Natural gas processing plants	Uranium mills
Processing plants:			
Number	11	2	0
Daily capacity	648,620 bbl	5 MMcf	0 tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	446	75,233	418,606	0
Industrial	0	28,592	24,589	395,951	0
Transportation	0	0	144,520	27,555	0
Electric power	0	35,053	27,204	5,474	1,822
Miscellaneous	4,322	0	1,385	0	0
Total	4,322	64,091	272,931	847,586	1,822

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	12.2	445.5	431.6	0	889.3	154.4	1,043.7
Industrial	0	779.6	146.2	408.2	0	1,334.0	160.3	1,494.3
Transportation	0	0	774.4	28.4	0	802.8	3.3	806.1
Electric power	0	783.0	167.7	5.7	19.0	975.4	...	...
Miscellaneous	109.8	0	8.5	0	0	118.3	...	118.3
Total	109.8	1,574.8	1,542.3	873.9	19.0	4,119.8	318.0	3,462.4
Percentages	2.7	38.2	37.4	21.2	0.5	100.0	...	....

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	101	3	9	113
Installed capacity (thousand kW)	20,967	156	1,652	22,775
Production (million kW-hr)	96,034	289	1,533	97,856

Total gross energy input: 4,119.8 trillion Btu

Total gross energy input per capita: 146 million Btu

Total net energy input: 3,462.4 trillion Btu

Total net energy input per capita: 291 million Btu

Salient Fuel Statistics—1972 Virginia

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Reserves	337,490	3,512,480	W	0	35,921	0
Production:						
Quantity	0	34,028	insig.	0	2,787	0
Value, thousands	0	344,061	insig.	0	892	0

Average number of active operations - Coal mines: 693 Crude oil wells: 1 Natural gas wells: 130 Uranium mines: 0

Labor force - Total: 1,947,900 Fuel sector (excluding processing): 12,438

	Petroleum refineries		Natural gas processing plants		Uranium mills
Processing plants:					
Number	1		0		0
Daily capacity	48,000	bbl	0	MMcf	0 tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	416	23,223	82,464	0
Industrial	0	2,717	10,080	64,849	0
Transportation	0	0	84,544	8,274	0
Electric power	0	5,089	25,610	4,512	1,810
Miscellaneous	9	0	1,129	0	0
Total	9	8,222	144,586	160,099	1,810

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	11.3	133.8	85.0	0	230.1	93.7	323.8
Industrial	0	74.1	61.0	66.9	0	202.0	32.4	234.4
Transportation	0	0	463.1	8.5	0	471.6	0	471.6
Electric power	0	113.7	160.4	4.7	18.9	297.7	...	...
Miscellaneous	0.2	0	6.7	0	0	6.9	...	6.9
Total	0.2	199.1	825.0	165.1	18.9	1,208.3	126.1	1,036.7
Percentages	insig.	16.5	68.3	13.7	1.5	100.0		

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	29	1	24	54
Installed capacity (thousand kW)	5,710	848	842	7,400
Production (million kW-hr)	28,441	448	1,362	30,251

Total gross energy input: 1,208.3 trillion Btu
Total gross energy input per capita: 254 million Btu

Total net energy input: 1,036.7 trillion Btu
Total net energy input per capita: 218 million Btu

Salient Fuel Statistics—1972 West Virginia

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Crude oil (thousand bbl)	Natural gas liquids (thousand bbl)	Natural gas (MMcf)	Uranium (thousand pounds recoverable U_3O_8)
Reserves	0	39,589,790	34,040	82,084	2,345,957	0
Production:						
Quantity	0	123,743	2,677	W	214,951	0
Value, thousands	0	1,275,813	12,047	W	64,485	0

Average number of active operations - Coal mines: 935 Crude oil wells: 12,136 Natural gas wells: 21,324 Uranium mines: 0

Labor force - Total: 657,300 Fuel sector (excluding processing): 50,023

	Petroleum refineries	Natural gas processing plants	Uranium mills
Processing plants:			
Number	3	4	0
Daily capacity	19,700 bbl	374 MMcf	0 tons of ore

CONSUMPTION

	Anthracite (thousand tons)	Bituminous coal and lignite (thousand tons)	Petroleum products (thousand bbl)	Natural gas (MMcf)	Hydropower and nuclear (million kW-hr)
Household-commercial	0	271	3,672	83,315	0
Industrial	0	9,436	11,813	130,279	0
Transportation	0	0	20,778	14,792	0
Electric power	0	19,805	655	457	534
Miscellaneous	W	0	70	0	0
Total	W	29,512	36,988	228,843	534

Salient Energy Statistics - 1972

ENERGY CONSUMPTION, TRILLION BTU

	Anthracite	Bituminous coal and lignite	Petroleum products	Natural gas	Hydropower-nuclear	Total gross inputs	Utility electricity distributed	Total net inputs (three sectors)
Household-commercial	0	7.4	21.7	85.9	0	115.0	24.1	139.1
Industrial	0	257.3	50.5	134.2	0	442.0	35.5	477.5
Transportation	0	0	110.9	15.3	0	126.2	0	126.2
Electric power	0	442.4	4.1	.5	5.5	452.5	...	...
Miscellaneous	W	0	0.4	0	0	0.4	...	0.4
Total	W	707.1	187.6	235.9	5.5	1,136.1	59.6	743.2
Percentages	-	62.2	16.5	20.8	0.5	100.0	...	...

	Fossil fuel	Nuclear	Hydropower	Total
Generating plants:				
Number	15	0	8	23
Installed capacity (thousand kW)	9,675	0	101	9,776
Production (million kW-hr)	48,466	0	534	49,000

Total gross energy input: 1,136.1 trillion Btu

Total gross energy input per capita: 633 million Btu

Total net energy input: 743.2 trillion Btu

Total net energy input per capita: 414 million Btu

Gas Intensive Industries by SIC Code

Gas Consumption 1971 (BCF)

Code	Industry Group	4-Digit	3-Digit	2-Digit
22	Textile Mill Products			100.7
2211	Weaving Mills, cotton	11.8		
2221	Weaving Mills, synthetics	12.4		
225	Knitting Mills		15.2	
2256	Knit Fabric Mills	7.4		
226	Textile Finishing, except wool		28.8	
2261	Finishing Plants, cotton	11.2		
2262	Finishing Plants, synthetics	13.9		
227	Floor Covering Mills		13.3	
2272	Tufted Carpets and Rugs	12.1		
228	Yarn and Thread Mills		7.1	
2281	Yarn Mills, except wool	4.1		
229	Miscellaneous Textile Goods		8.8	
2295	Coated Fabrics, not rubberized	3.4		
23	Apparel, Other Textile Products			14.2
2327	Men's and Boys' Separate Trousers	2.1		
2392	House Furnishings	2.0		
24	Lumber and Wood Products			71.1
2421	Sawmills and Planning Mills	19.1		
2432	Veneer and Plywood	17.8		
2499	Wood Products	21.4		
25	Furniture and Fixtures			18.8
2511	Wood Household Furniture	4.2		
2522	Metal Office Furniture	2.8		
2542	Metal Partitions and Fixtures	2.6		
26	Paper and Allied Products			477.0
2621	Paper Mills, except building paper	195.2		
2631	Paperboard Mills	175.3		
2653	Corrugated and Solid Fibre Boxes	16.5		
2661	Building Paper and Board Mills	22.8		
2711	Newspapers	8.4		
2751	Commercial Printing, except lithographic	12.7		
2752	Commercial Printing, lithographic	7.3		
28	Chemical and Allied Products			1,427.5
281	Industrial Chemicals		1,122.0	
2818	Industrial Organic Chemicals	586.1		
2819	Industrial Inorganic Chemicals	364.5		
282	Plastics Materials and Synthetics		159.3	
2821	Plastics Materials and Resins	52.3		
2822	Synthetic Rubber	49.0		
2823	Cellulosic Manmade Fibres	11.6		
2824	Organic Fibres, noncellulosic	41.0		
283	Drugs		17.0	
2834	Pharmaceutical Preparations	13.8		
284	Soap, Cleaners, and Toilet Goods		20.6	
2841	Soap and Other Detergents	14.0		
287	Agricultural Chemicals		56.0	
2871	Fertilizers	46.6		
289	Miscellaneous Chemical Products		46.7	
2892	Explosives	7.0		
2895	Carbon Black	18.7		
2899	Chemical Preparations	15.9		
29	Petroleum and Coal Products			1,321.5
2911	Petroleum refining	1,291.1		
295	Paving and Roofing Materials		22.4	
2951	Paving Mixtures/Blocks	10.3		
2952	Asphalt Felts and Coatings	12.2		
30	Rubber and Plastics Products			76.6
3011	Tires and Inner Tubes	28.9		
3069	Fabricated Rubber Products	19.6		
3079	Miscellaneous Plastics Products	27.0		
31	Leather and Leather Products			8.2

Gas Consumption 1971 (BCF) (continued)

Code	Industry Group	4-Digit	3-Digit	2-Digit
3111	Leather Tanning and Finishing	4.6		
32	Stone, Clay and Glass Products			703.9
3211	Flat Glass	50.4		
322	Glass, Glassware, pressed or blown		171.3	
3221	Glass Containers	116.2		
3229	Pressed and Blown Glass	55.0		
3241	Cement, hydraulic	201.7		
325	Structural Clay Products		102.3	
3251	Brick and Structural Clay Tile	75.3		
3255	Clay Refractories	23.6		
3259	Structural Clay Products	16.9		
326	Pottery and Related Products		15.5	
3261	Vitreous Plumbing Fixtures	5.4		
3264	Porcelain Electrical Supplies	4.0		
327	Concrete, Gypsum, Plaster Products		85.6	
3274	Lime	38.0		
3275	Gypsum Products	29.6		
329	Miscellaneous Nonmetallic Mineral Products		69.0	
3295	Minerals, ground or treated	16.2		
3296	Mineral Wool	30.0		
33	Primary Metal Industries			1,102.0
331	Blast Furnace, basic steel products		661.5	
3312	Blast Furnaces and Steel Mills	632.8		
332	Iron and Steel Foundries		59.8	
3321	Gray Iron Foundries	32.7		
3323	Steel Foundries	18.6		
333	Primary Nonferrous Metals		199.0	
3331	Primary Coppers	43.6		
3333	Primary Zinc	20.2		
3334	Primary Aluminum	120.8		
339	Miscellaneous Primary Metal Products		54.3	
3391	Iron and Steel Forgings	26.0		
3399	Primary Metal Products	21.2		
34	Fabricated Metal Products			157.4
3421	Metal Cans	19.1		
3443	Fabricated Platework (boiler shops)	12.8		
3461	Metal Stampings	18.5		
3494	Valves and Pipe Fittings	14.9		
35	Machinery, except electrical			149.2
3522	Farm Machinery	17.4		
3531	Construction Machinery	15.8		
3585	Refrigeration Machinery	13.4		
36	Electrical Equipment and Supplies			107.6
362	Electric Industrial Apparatus		22.2	
3621	Motors and Generators	9.0		
3624	Carbon and Graphite Products	8.5		
366	Communication Equipment		19.6	
3661	Telephone and Telegraph Apparatus	10.3		
3662	Radio and TV Communication Equipment	9.4		
37	Transportation			141.6
371	Motor Vehicles and Equipment		96.0	
3711	Motor Vehicles	44.9		
3714	Motor Vehicles Parts and Accessories	45.7		
372	Aircraft and Parts		31.8	
3721	Aircraft	15.0		
38	Instruments and Related Products			15.8
3861	Photographic Equipment and Supplies	5.1		
39	Miscellaneous Manufacturing Industries			21.3
3949	Sporting and Athletic Goods	3.0		
3994	Morticians' Goods	3.0		

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* Source: Department of Commerce

Section 5

A Format To Assess and Manage a Curtailment

Purpose

This section is, in essence, an arrangement of forms which provides the team member on location with a framework which will:

- Lead to a rapid understanding and assessment of the effects of a curtailment or shortfall and the potential chances of obtaining an effective relief and its potential benefits.
- Provide a uniform reporting format in which all pertinent facts can be recorded and become part of the main files.

The method presented here assumes that data are obtained on an historical basis, primarily from the utility company; in general, this can be achieved with a reasonable degree of objectivity. By inserting them into the proper spaces on the forms and by some simple computations, the team can obtain a "working knowledge" of the situation and ready itself for more detailed discussions with those who are concerned with the economic and social effects of the curtailment.

Content

A data-gathering and assessment scheme is presented which consists of two parts:

A. Deals with the data pertaining to energy demand and supply, the potential penalties to be expected from a curtailment or shortfall and some guidelines on how to prioritize end-use in a manner which reduces the economic impact on the community.

B. Provides a record of the remedial actions which have been taken or are contemplated. This part will determine the inevitable "residual shortfall" which can then be introduced into Part A and give a measure of the economic consequences of the natural gas shortage in the particular situation.

Part A consists of a sequence of six forms which are arranged as follows:

1. Presents numerical evidence on the supply capability and its upper performance limits.
2. Provides basic descriptive data on the demography of the locality.
3. Gives the basic meteorological data for the design and energy demand of the heating equipment as it is revealed by past and present records.
4. Gives a broad survey of end-uses and determines the effective curtailment rate in percent.
5. Lists the critical gas-dependent industries.
6. First assessment of the economic effects. By assigning priorities, the form can be used over and over again to establish the configurations which will minimize the economic impact, be it in terms of value added or unemployment.

Part B consists of a sequence of three forms which combine the relief actions possible under FPC, FEA, and related efforts. The last form gives a measure of the ultimate residual shortfall, which can then be reintroduced into Part A to compute the inevitable economic impact.

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Local Offices

City	Zip
County	
State	
Primary Contacts	
Agency or Office	
Dept. of Commerce Address Contact Telephone Telex	
State Energy Office Address Contact Telephone Telex	
State Utility Comm.ⁿ Address Contact Telephone Telex	
Local Energy Cogn. Address Contact Telephone Telex	

Compiler of data

Date

Energy Supply Capability

Part A Form 1

Main Suppliers (Gas Pipelines)	Address	Contact	Telephone

Gas—Distributor(s)	Address	Contact	Telephone

Gas Supply Capabilities

Main throughput	MMCF/year	Gas Storage capab.	MMCF
Winter rate	MMCF/day	LNG Capacity	MMCF
for ____ months		Max. delivery rate from these ①	MMCF/day
		time limit ____ days	
Summer rate	MMCF/day	Propane availability	MMCF
Peak (average over ____ years)	MMCF/day	Maximum Rate of addition ②	MMCF/day
Maximum Flow Rate	MMCF	time limit ____ days	
Amount available ③ after curtailment	MMCF/day	Maximum available ①+②	MMCF/day
		time limit ____ days	

Curtailment percentage % (enter in sheet A6)

Alternate Energy Sources (descriptive estimates)

Oil as a group	BBL/day	gas equiv.	MMCF/day
Electricity	KW	gas equiv.	MMCF/day
Coal	t/day	gas equiv.	MMCF/day

Transportation capability for alternates:

State Set aside for alternate Fuels: MMCF

rate available for release on location ④ MMCF/day

for how long? ____ days

Maximum available energy flow rate in gas equivalents → ①+②+③+④ MMCF/day

Demographic Data

Part A Form 2

General data	Work force	Financial
Population	Total number of production workers	City budget $ p.a.
Number of households	% full time	Mean family income $ p.a.
Cost of Living Index	% part time	
Commuters into town	Unemployment, current %	
	seasonal %	
	non seasonal %	

Weather, Heating Demand and Conservation

Part A Form 3

Mean local degree days ____ ① design temperature ____

Average summer demand (baseload) MMCF/day

Historical winter demands MMCF/day

Difference = heating demand ② MMCF/day

Historical slope ② ÷ ① MMCF/day degree days

Records of recent months

Year:	Nov	Dec.	Jan.	Feb.	Mar.	Total
demand (resid. + comm.)						
deduct baseload						
Differential demand (heat)						
degree days						
Δ heat						
Δ degree days						
slope						

Compute conservation effects

Room temperature 68 F % reduction → MMCF/day

Room temperature 65 F % reduction → MMCF/day

General Demand Survey (Effect of Conservation Measures)

Part A Form 4

end-user category	absolute demand		% of total demand	
	without MMCF/day conservation	with MMCF/day conservation	without % conservation	with % conservation
residential		⑤		
commercial		⑥		
power generation		⑦		
industrial	⑨			
if separately recorded public services (hospitals, schools, etc.)		⑧		
Total			100%	100%
Effective Reduction due to conservation		MMCF/day	100%	

From Form A1 Bottom Line ① · ② · ③ · ④ ____________ MMCF/day

Deduct ⑤ + ⑥ gives NG supply available
for power generation + industrial use ____________ MMCF/day

Deduct ⑦ + ⑧ gives residual available
for industrial use ____________ MMCF/day

Divide by ⑨ gives effective curtailment
rate ____________ %

↑
Enter this figure
into Form A6.

Spectrum of the Major Industrial Gas Users

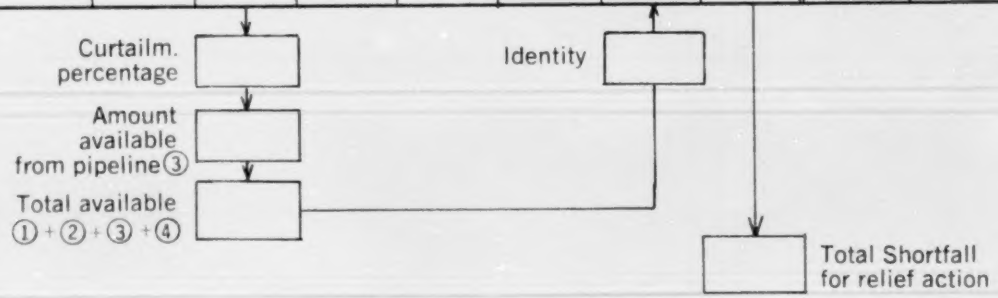
Part A Form 5

No.	Name of firm	SIC Code	gas usage	number of produc. workers	sales	value added	payroll	production hours per week	type of contract	FPC priority	continuous operation mandatory
			MMCF/day		$ p.a.	$ p.a.	$ p.a.	hrs. per week			
1											
2											
3											
4											
5											
6											
7											
8											
Total of the above①											
Total industrial complex②											
Percentage ①/②								%			

Curtailment Effect Assessment (Industrial Users Only)

Part A Form 6

	on weekly basis										Deficits on weekly basis					
No.	employees per MMCF	payroll per MMCF	sales per MMCF	added value per MMCF	Substitute Fuel cap.	Present gas usage	Substitute cap.	Residual Demand	Allocation of gas	Remaining shortfall	employment	payroll	sales	added value	Employment priority	Sales priority
		$	$	$	MMCF per day	MMCF per day	%	%	MMCF per day	MMCF per day		$	$	$		
1																
2																
3																
4																
5																
6																
7																
8																
Total																


Curtailm. percentage
Amount available from pipeline③
Total available ①+②+③+④
Identity
Total Shortfall for relief action

Part B

Record of FPC Remedial Actions To-Date (For guidance see chart, Section 2, page 2.2.7)

No. on A6 if appl.	Who applied?	Category							Sale		Relief mechanism				Quantity requested	Date initiat.	Applied to?	Action to date
		Comm	Ind.	Ind. direct	Distr.	Pipe-line	P.U.C.	Other	by	to	Emer-gency	Extra-ord.	Self help	Direct sale				

Total quantity request ☐ ☐ Received to date

Record of FEA Remeidal Actions To-Date (For guidance see chart, Section 2, page 2.3.17)

No. on A6 if applicable	Who applied?	End-user cat.			Desired Alternate				Relief Mechan.			State Set-aside	Quantity requested	Base Line		Date initiat.	Applied to ?	Action to date
		Ind.	Comm.	Util.	Prop.	Middle distill.	Resi-dual	Other	Assign	Adjust	Waiver		Nat. Gas equiv.	yes	no			

Total quantity requested ☐ ☐ Received to date

↑
Correction here

Summary of FPC, FEA and Local Relief Actions (All in MMCF/ Day)
(For guidance see chart on page 2.4 of Section 2)

Go back to A6 and compute inevitable hardships as a function of residual energy shortfall Part B

Shortfall		FPC Type Allotment	FEA Type Allotment	Additional Supplies Obtained via Distributor	Savings Due to Conservation Program	Inevitable Residual Shortfall
	Received					
	Requested					

Glossary

ABSORPTION. The penetration of one substance into the inner structure of another. In physiochemistry, through the process of "absorption" a liquid takes up molecules of a gas or vapor.

ACETYLENE ($HC\equiv CH$). A colorless, highly flammable, explosive gas with an ethereal odor. It is soluble in alcohol and acetone; only slightly soluble in water. Acetylene is used in vinyl chloride and vinylidene chloride; vinyl acetate; welding and cutting metals; neoprene, acrylonitrile; acrylates; per- and trichloroethylene; cyclooctatetraene; tetrahydrofuran; and carbon black.

ADJUSTMENT CLAUSE. See CLAUSE, ADJUSTMENT.

ALLOCATED PRODUCTS. Residual fuel oil and refined petroleum products. (FEA)

ALLOWABLES. The permitted rate of production from a well or a group of wells that is allowed by a particular State or governing body. The rate is set by rules that vary among the various States or governing bodies.

ALTERNATE FUEL CAPABILITIES. A situation where an alternate fuel could have been utilized, whether or not the facilities for such use have actually been installed; provided, however, where the use of natural gas is for plant protection, feedstock, or process uses and the only alternate fuel is propane or other gaseous fuel then the consumer will be treated as if he had no fuel. (FPC)

ALTERNATE FUELS (AND ENERGY). Fuel oil (distillate and residual), coal, direct use of propane or butane, and electricity used in place of natural gas.

ANTHRACITE. A hard coal containing 86-98% fixed carbon, which has a brilliant luster, conchoidal fracture and is combustible. It is found generally in Pennsylvania, USSR, Europe, and Korea. It is used as an industrial fuel in the manufacture of PRODUCER GAS and WATER GAS; and is the source of coke and amorphous carbon (see CARBON, ACTIVATED).

ASSIGNMENT. An action taken by FEA, or an authorized State official, designating that an authorized purchaser be supplied at an allocation entitlement level determined by the FEA or an authorized State official, by a specified supplier. (FEA)

ASSOCIATED NATURAL GAS. See GAS, NATURAL.

AVERAGE ANNUAL GAS CONSUMPTION PER CUSTOMER (BY CLASS OF SERVICE.) Average annual therms used per customer by class of service; annual therm sales to a class divided by the number of customers for that class of service. (May use Mcf instead of therms.)

AVERAGE ANNUAL GAS REVENUE PER CUSTOMER (BY CLASS OF SERVICE). Total annual revenue exclusive of forfeited discounts and penalties (from a class of service) divided by the number of customers in that class of service.

ANNUAL REVENUE PER THERM OF GAS SALES (BY CLASS OF SERVICE). Revenue from the sale of gas to a class of service, exclusive of forfeited discounts and penalties, divided by the corresponding number of therms sold. (May calculate average revenue per Mcf.)

BARREL (OIL). A volumetric unit of measurement equivalent to 42 U.S. Standard gallons.

BASE PERIOD. Each calendar quarter during the period April 1, 1972, through March 31, 1973, which corresponds to the present calendar quarter, except that purchasers of propane may, at their option, use the period June 1, 1972, through June 30, 1972, as the base period. (FEA)

BENCH GAS. See COAL GAS.

BITUMINOUS COAL. A broad class of soft coals having 46-86% fixed carbon and approximately 20-40% volatile matter, which yields about 11,000 or more Btu per pound. It is combustible in bulk form. Bituminous coal is found in Pennsylvania, West Virginia, Illinois, Indiana, Wyoming, and Utah. It is used in fuel; coke production for the manufacture of pig iron; PRODUCER GAS, COAL GAS, and briquets; and as a source of coal tar, hydrogen cyanide, and CARBON BLACK.

BLAST-FURNACE GAS. A by-product from the smelting of iron ore with coke and preheated air in the blast furnace. Its low Btu value requires regenerative preheating, as with producer gas.

BLOWDOWN. See VENTING.

BOILER RATING. The rating of a steam boiler expressed as the total heat transferred by the heating service in Btu per hour. Sometimes expressed in horsepower or pounds.

BONDED FUELS. Those fuels produced outside the customs limits of the United States, held in bond under continuous United States customs custody in accordance with Treasury Department regulations and destined for use outside of the United States, its territories, or possessions. (FEA)

BOTTLED PROPANE. Propane bottled in cylinders with a capacity of one hundred (100) pounds or less. (FEA)

BRANDED INDEPENDENT MARKETER. A firm engaged in the marketing or distributing of refined petroleum products pursuant to:

(a) An agreement or contract with a refiner (or a firm that controls, is controlled by, or is under common control with such refiner) to use a trademark, trade name, service mark, or other identifying symbol or name owned by such refiner (or any such firm), or

(b) An agreement or contract under which any such firm engaged in the marketing or distributing of refined petroleum products is granted authority to occupy premises owned, leased, or in any way controlled by a refiner (or firm that controls, is controlled by, or is under common control with such refiner), but that is not affiliated witn, controlled by, or under common control with any refiner (other than by means of a supply contract, or an agreement or contract described in paragraph (a) or (b) of this definition), and which does not control such refiner. (FEA)

BRITISH THERMAL UNIT (BTU). The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit under stated conditions of pressure and temperature. This is the accepted standard for the comparison of the heating values of fuels.

BURNER CAPACITY. The maximum Btu per hour that can be released by a burner, while burning with a stable flame and satisfactory combustion. Also called burner rating.

BURNER, GAS. A device for the final release of air/gas or oxygen/gas mixtures or air and gas separately into the combustion zone. Gas burners may be classified as atmosphereic burners or blast (pressure) burners.

BURNER HEAD. The portion of the burner beyond the outlet end of the mixer tube that contains the ports.

BUTADIENE (C_4H_6). A highly flammable hydrocarbon gas or liquid produced from petroleum or alcohol, butadiene is used after polymerization in making buna (synthetic rubber); as a starting material for adiponitrile (nylon 66); in latex paints; resins; and organic intermediates.

BUTANE (C_4H_{10}). A colorless, flammable, explosive gas with a natural gas odor, soluble in water and alcohol. Butane is a by-product in petroleum refining or natural gas manufacture, is used in organic synthesis; raw material for synthetic rubber and high-octane liquid fuels; fuel for household and industrial purposes; manufacture of ethylene; solvent; refrigerant; standby and enricher gas; propellent in aerosols; pure grades used in calibrating instruments; and food additives.

BUTANE-AIR PLANT. A gasification plant, where liquid butane is vaporized and mixed with air and delivered into a gas distribution system for consumer use.

BY-PRODUCTS (RESIDUALS). Secondary products that have commercial value and are obtained from the processing of a raw material. They must be the residues of the gas production process, such as coke, tar, and ammonia, or they may be the result of further processing of such residues, such as ammonia sulphate.

CAPACITY, EFFECTIVE. The maximum load that a machine, apparatus, device, plant, or system is capable of carrying under existing service conditions.

CAPACITY, INSTALLED. The maximum load for which a machine, apparatus, device, plant, or system is designed or constructed, not limited by existing service conditions.

CAPACITY, PEAKING. The capacity of facilities or equipment normally used to supply incremental gas under extreme demand conditions and beyond contractual quantities.

CARBON, ACTIVATED. An amorphous carbon form characterized by high adsorptivity for gases, vapors, and colloidal solids. Activated carbon is used in decolorizing sugar; water purification; solvent recovery; waste treatment; sulfur dioxide removal from stack gases and "clean" rooms; deodorant; jet fumes removal from airports; catalyst; and natural gas purification.

CARBON BLACK. Almost pure amorphous carbon consisting of extremely fine particles, made by the incomplete combustion or thermal decomposition of natural gas or petroleum oil. The principal types, according to the production method, are channel black, furnace black, and thermal black. Carbon black is used as a reinforcing agent in producing rubber and other abrasion-resistant products and plastics.

CARBURETED WATER GAS. Largely a mixture of "blue" WATER GAS and rich OIL GAS. The richer oil gas is carbureted with the low Btu-value water gas in order to enhance its heating value and luminous qualities.

CASINGHEAD GAS. See GAS, CASINGHEAD.

CATALYST. Any substance of which a fractionally small percentage strongly affects the rate of a chemical reaction. Though the catalyst itself undergoes no chemical change, it is often altered physically by chemically adsorbed molecules of the reactants.

CERTIFICATE OF CONVENIENCE AND NECESSITY. (1) A special permit, which supplements the franchise, commonly issued by a State utility commission that authorizes a utility (a distribution company) to engage in business, construct facilities, or perform some other service. (2) A permit issued by the Federal Power Commission to engage in the transportation or sale for resale of natural gas in interstate commerce or to construct or acquire and operate any facilities necessary therefor, to which certificate the Commission may attach such reasonable terms and conditions as the public convenience and necessity may require.

CHANNEL BLACK. See CARBON BLACK.

CLASS OF SERVICE. Defines consumer types. The common classes of services as applied to ultimate consumers and as recommended for statistical purposes, by the American Gas Association for use by gas utilities are:

1. Residential Service

   (a) Without Space Heating. Service to customers supplied for residential purposes (cooking, water heating, kitchen heating, where another fuel is principal heat for premises, etc.) by individual meter in a single family dwelling or building, or in a single flat or apartment, or to not over four households served by a single meter (one customer) in a multiple family dwelling, or portion thereof.

   Service for residential purposes supplied to five or more households served as a single customer (one meter) under one rate classification contract is considered as commercial and is counted as only one customer.

   Residential premises also used regularly for professional or business purposes (such as a doctor's office in a home, or where a small store is integral with the living space) are considered as residential, where the residential use is half or more of the total gas volume; otherwise, these are commercial.

   Dormitories, hotels, religious and eleemosynary institutions (such as orphan homes), boarding and rooming houses, motor courts, camps, etc., are considered as commercial customers for statistical purposes, even though they are supplied by the company on a residential rate contract. (See item 2 below.)

   (b) With Space Heating. Service to customers using gas to supply the principal space heating requirements of a dwelling; other residential uses are included herein, if supplied under the same rate classification.

   (c) Air Conditioning Service. Service to customers using gas to supply the principal air cooling requirements of a dwelling; other residential uses (cooking, water heating, etc.) are included in this classification, is supplied under the same rate classification. These customers will be included under items (a) or (b) above, as appropriate, so the sum of (a) and (b) will be Total Residential Service. However, for statistical purposes, "Residential Air Conditioning Service" (including any other residential use) also should be tabulated separately to distinguish this from other types of residential service.

2. Commercial Service.

   Service to customers engaged primarily in wholesale or retail trade, agriculture, forestry, fisheries, transportation, communication, sanitary services, finance, insurance, real estate, personal services (clubs, hotels, rooming-houses, five or more households served as a single customer, auto repair, etc.), government, and service that does not directly come in one of the other classifications of service. (See Standard Industrial Classification Manual.)

   (a) The size of the customer or volume of use is not a criterion for determining Commercial Service. The nature of the customer's primary business or economic activity at the location served determines the customer classification. If a particular load to a manufacturing or processing plant represents the cafeteria of the plant, or a heating load, with or without any processing load, whether or not separately metered, the account is classified as Industrial Service, item 3 (c).

   (b) Gas supplied to commercial customers for air conditioning or space heating is included under Commercial Service, whether or not supplied under a separate rate contract. See general definition at the beginning of section 2, and item (c) below.

   (c) For statistical purposes, Commercial Air Conditioning Service (including any other commercial use under the same rate classification) should be tabulated separately to distinguish this from other types of commercial use. This also applies to gas sold under interruptible or off-peak rates or contracts.

3. Industrial Service

   Service to customers engaged primarily in a process that creates or changes raw or unfinished materials into another form or product. This includes establishments in mining and manufacturing. (See Standard Industrial Classification Manual.)

   (a) The size of the customer or the volume of use is not a criterion for determining Industrial Service. The nature of the company's primary business or economic activity at the location served determines the distinction used. If a manufacturing corporation has only a sales office, no plant, at a particular location, this is classified as Commercial Service on the basis of primary activity. If, however, the sales office is part of a manufacturing plant, this is classified as Industrial Service.

   (b) Gas supplied to these customers for air conditioning or for space heating is included under Industrial Service, whether or not supplied under a separate rate contract.

   (c) For statistical purposes, however, Industrial Air Conditioning Service (including any other industrial use under the same rate classification) should be tabulated separately to distinguish this from other types of industrial use. This also applies to gas sold under interruptible or off-peak rates or contracts.

4. Other Services

   Service to municipalities or divisions (agencies) of State or Federal Governments under special contracts or agreements or service classifications, applicable only to public authorities using gas for general or institutional purposes. (Exclude sales properly included under items 2 or 3 above, such as manufacturing arsenals or publicly-owned power systems.)

5. Service to Other Utilities—Sales for Resale (Uniform System of Accounts, 483)

   Service to other utility companies, governmental agencies (Municipal, County, State, or Federal), rural cooperatives, etc., for distribution and resale to ultimate customers. Service to other utilities for use by them and not for distribution and resale, is to be classified as residential, commercial, or industrial, depending upon the primary business or economic activity.

CLAUSE, ADJUSTMENT. A provision in a utility tariff that provides for changes in gas rate charged a customer due to increases or decreases in certain costs incurred by the seller, such as purchased gas cost, transportation costs, or advance payments made for gas.

COAL. Relatively dense carbonaceous solid produced from prehistoric vegetable matter and found widely distributed in natural veins and deposits, which contains various amounts of hydrocarbons, complex organic compounds and inorganic materials. It is classified generally as lignite, sub-bituminous, and BITUMINOUS.

COAL CHAR. Residue from the gasification process that may serve as a power source (a fuel) for gasification plants.

COAL GAS. Also known as bench gas, coke-oven gas. A mixture of gases produced by the destructive distillation of bituminous coal in highly heated fire-clay or silica retorts or in by-product coke ovens. Coal gas is used directly in open hearth furnaces.

COAL OIL. Crude petroleum, kerosene, or the crude oil from the destructive distillation of bituminous coal.

COKE-OVEN GAS. See COAL GAS.

COKER FEEDSTOCK. Any crude oil or unfinished oil, as defined by Oil Import Regulation 1, Revision 5 (32A CFR 01 Reg.

1.22(f)-(h)) that is used as a feedstock to any of the various types of process units in a refinery known as "cokers."

COMBINATION UTILITY. A utility that supplies both gas and some other utility service (electricity, water, traction, etc.). (See also STRAIGHT GAS UTILITY and UTILITY.)

COMMERCIAL. Service to customers engaged primarily in the sale of goods or services, including institutions and local and Federal government agencies for uses other than those involving manufacturing or electric power generation. (See also CLASS OF SERVICE: Commercial Service.)

COMMODITY CHARGE. A charge per unit volume of gas actually delivered to the buyer.

COMPANY USED GAS. The quantity of gas consumed by a distribution company or transmission company for its own use as fuel for compressors.

CONSUMER, GAS. The ultimate user of gas, as contrasted to a "customer," who may purchase gas for resale.

CONTRACTED RESERVES. Natural gas reserves dedicated to the fulfillment of gas purchase contracts.

COVERED PRODUCTS. Crude oil, residual fuel oil, and refined petroleum products. (FEA)

CRACKING. The process of breaking down a heavier HYDROCARBON by heat and pressure or by catalysts into lighter hydrocarbons of lower molescular weight, producing gasoline from petroleum or other lower-boiling materials useful as motor oils, domestic fuel oil, or other needed products. Cracking to lighter hydrocarbons is important to OIL GAS and CARBURETED WATER GAS production.

CRUDE OIL. A mixture of liquid hydrocarbons, including lease condensate that exists in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. (See also PETROLEUM.) (FEA)

CURRENT REQUIREMENTS. The supply of an allocated product needed by an end-user or wholesale purchaser-consumer to meet its present supply requirements for a particular use of that product, but does not include any amounts that an end-user or wholesale purchaser-consumer (a) purchases or obtains for resale, (b) accumulates as an inventory in excess of that purchaser's customary inventory maintained in the conduct of its normal business practices, or (c) uses in excess of the supply necessary to meet present supply requirements as constrained by the implementation of the energy conservation program required 10 CFR, 211.21. (FEA)

CURTAILMENT. The difference between the volume of gas interstate pipelines will actually deliver to their customers (i.e., the supply) and the firm requirements (i.e., contractual obligations) of these pipelines.

CURTAILMENT GUIDELINES. Policies of Federal and State regulatory agencies concerning the way a curtailment of gas service will be implemented by pipelines and/or distribution companies. The two basic approaches are (1) pro rata, a flat percentage reduction in supply, applied to all customers (by a transmission company) or to all consumers in a given class of service (by a distribution company) and (2) end use, a more selective approach, which considers the purpose for which gas is used in establishing priorities.

CUSTOMER CHARGE. A fixed amount to be paid periodically by the customer, without regard to demand or energy consumption.

CUSTOMER COSTS. The costs directly related to serving the customer, regardless of sales volume, such as meter reading, billing, and fixed charges for the minimum investment required to serve a customer.

DEFICIENCY, GAS. The difference between a distribution company's total gas supply and the total requirements of its customers. It may be expressed either in absolute volumes (Mcf) or as a percentage of total requirements.

DEGREE-DAY FORMULA. Any one of the various systems in use by retailers to provide wholesale purchaser-consumers or end-users with automatic delivery service of an allocated product for space-heating. (FEA)

DEGREE-DAY, HEATING. A measure of the coldness of the weather experienced, based on the extent to which the daily mean temperature falls below a reference temperature, usually 65°F. (FEA)

DEMAND. The rate at which gas is delivered to or by a system, part of a system, or a piece of equipment, expressed in cubic feet or therms or multiples thereof, for a designated period of time called the demand interval.

DEMAND, AVERAGE. The demand on a system or any of its parts over an interval of time, determined by dividing the total number of cubic feet or therms by the number of units of time in the interval.

DEMAND, BILLING. The demand upon which billing to a customer is based, as specified in a rate schedule or contract. Because it may be based on the contract year, a contract minimum, or a previous maximum, it may not necessarily coincide with the actual measure demand of the billing period.

DEMAND, CONTRACT. The daily quantity of gas the supplier agrees to furnish and the buyer agrees to buy, under a specific contract.

DEMAND DAY. The 24-hour period specified by a supplier-user contract for purposes of determining the purchasers' daily quantity of gas used (e.g., 8 a.m. to 8 a.m.). This term is used primarily in pipeline-distribution company agreements. It is similar to and normally coincides with the distribution company "send-out day."

DEPLETION. As applied to natural gas-producing land, the loss in service value incurred in connection with the exhaustion of the natural resource in the course of service.

DESIGN DAY. A 24-hour period of the greatest theoretical gas demand, used as a basis for designing gas purchase contracts, and/or production facilities, and/or delivery capacity.

DESIGN DAY AVAILABILITY. The amount of each type of gas arranged to be available on the design day and the maximum combination of such supplies. (In the case of purchased natural gas, the maximum day allocation, maximum day contract quantity, or FPC authorization.)

DESIGN DAY TEMPERATURE. The mean temperature assumed for the Design Day.

DESTRUCTIVE DISTILLATION. Decomposition of a material by heat and simultaneous distillation of volatile products, e.g., the destructive distillation of coal to form coke, coal tar, and other liquid and gaseous products.

DEVELOPMENT COSTS. With respect to hydrocarbons, include all costs in the readying of hydrocarbon deposits for commercial production, including developmental well drilling costs. (FPC)

DIFFUSION. The spontaneous mixing of one substance with another. Any gas or mixture of gases will diffuse into others.

DIRECT FLAME PROCESS GAS. Gas use for which alternate fuels are not technically feasible, such as in applications requiring precise temperature controls and precise flame characteristics for those customers who have contracted for service under specific rate schedules applicable only to this class of service. (For FPC definition, see PROCESSING GAS.)

DISPENSING STATION. Those retail sales outlets that sell less than 15,000 gallons per year and sell or fill only bottled propane. (FEA)

DISPERSION. System of minute particles (solid, liquid, or gaseous) distinct and separate from one another and suspended in a liquid, gaseous, or solid medium, e.g., smog.

DISSOLVED NATURAL GAS. See GAS, NATURAL.

DISTILLATE FUEL OILS. Fuel oils produced by distillation as distinguished from RESIDUAL FUEL OILS, which are left from the refining process.

DISTILLATION. The process of vaporizing a liquid and collecting the vapor, which is usually condensed to a liquid, a distillate. Gasoline, kerosene, fuel oil, and lubricating oil are produced from petroleum through distillation.

DISTRIBUTION. The process of distributing gas from the city gate or plant to the ultimate consumers.

DISTRIBUTION COMPANY, GAS. A company that obtains the major portion of its gas operating revenues from the operation of a retail gas distribution system, and that operates no transmission system other than incidental connections within its own system or to the system of another company.

DISTRIBUTION SYSTEM. The gas mains provided primarily for distributing gas within a distribution area, together with land, structures, valves, regulators, services, and measuring devices, including the mains for transportation of gas from production plants or points of receipt located within such a distribution area to other points therein. The distribution system owned by companies having no transmission facilities connected to such distribution systems begin at the inlet side of the distribution system equipment that meters or regulates the entrance of gas into the distribution system and ends with and includes property on the consumer's premises. For companies that own both transmission and distribution facilities on a continuous line, the distribution system begins at the outlet side of the equipment that meters or regulates the entrance of gas into the distribution system and ends with and includes property on the consumer's premises. The distribution system does not include storage land, structures, or equipment. (FPC)

DRILLING-MUD WEIGHTING MATERIALS. Class name for materials added to drilling mud to control gas, oil, water, formation pressures and to aid in maintaining walls of the open hole.

DRY NATURAL GAS. See GAS, NATURAL.

DULY AUTHORIZED REPRESENTATIVE. A person designated to appear before the FEA or a State office in connection with a proceeding on behalf of a person interested in or aggrieved by that proceeding. Such appearance may consist of the submission of applications, petitions, requests, statements memoranda of law, other documents, or of a personal appearance, verbal communication, or any other participation in the proceedings. (FEA)

ELIGIBLE PRODUCTS. Residual fuel oil, No. 2 heating oil and No. 2-D diesel fuel imported into the United States, except that imports into United States customs territory from United States possessions, territories or foreign trade zones shall not be considered eligible products. (FEA)

EMERGENCY SERVICES. Law enforcement, fire fighting, and emergency medical services.

ENRICHING. Increasing the heat content of a gas by mixing with it a gas of higher Btu content. An example is CARBURETED WATER GAS.

ESSENTIAL HUMAN NEEDS. Hospitals, nursing homes, orphanages, prisons, sanitoriums; gas used for water and sewage treatment, and boarding schools, where gas volumes are used for residential purposes, for those customers who have contracted for service under specific rate schedules applicable only to this class of customer. (FPC)

ETHANE (C_2H_6). A colorless, odorless, flammable hydrocarbon gas, derived by fractionation of natural gas and used for organic synthesis, as a refrigerant, and fuel.

ETHANOL (C_2H_5OH). Ethyl alcohol.

ETHYLENE (C_2H_4). A colorless, extremely flammable gas with a rather sweet odor and taste. Ethylene is derived from the thermal cracking of petroleum (refinery off-gases) and constituents of natural gas (propane, ethane, butane, and naphtha). It is used in making ethyl alcohol, ethylene glycols, polystyrene, polyethylene, polyester resins, etc.; refrigerants; cryogenic research; agricultural chemistry; welding and cutting of metals; and anesthetics.

EXCEPTION. A waiver or modification of the requirements of a regulation, ruling, or generally applicable requirement under a specific set of facts. (FEA)

EXCHANGE GAS. Gas that is received from (or delivered to) another party in exchange for gas delivered to (or received from) such other party.

EXEMPTION. The release from the obligation to comply with any part or parts, or any subpart, of FEA regulations. (FEA)

EXPLOSIVE LIMITS. The lowest (lower limit) and highest (upper limit) concentration of a specific gas or vapor in mixture with air that can be ignited at ordinary temperature and pressure of the mixture. Also called combustible limits or flammable limits.

EXTRACTIVE DISTILLATION. A variety of distillation that always involves the use of a fractioning column, and is characterized by a purposely added substance that modifies the vaporization characteristics of the materials undergoing separation, to make them easier to separate.

FEDERAL ENERGY ADMINISTRATION (FEA). An agency of the United States Government created by the Federal Energy Administration Act of 1974 (P.L. 93-275) and includes the FEA National Office and Regional Offices.

FEDERAL POWER COMMISSION (FPC). An agency of the United States Government that has jurisdiction over the natural gas companies and producers that sell or transport gas for resale in interstate commerce. With respect to the gas industry, the general regulatory principles of the FPC are defined in the Natural Gas Act, as amended.

FEEDSTOCK, COKER. See COKER FEEDSTOCK.

FEEDSTOCK GAS. Natural gas used as raw material for its chemical properties in creating an end product, including atmospheric generation for those customers who have contracted for service under specific rate schedules applicable only to this class of service. (See also PETROCHEMICALS as well as associated articles.)

FIELD PRICE. The price paid for natural gas at the wellhead or outlet of a central gathering point in a field.

FIRM REQUIREMENTS. Volumes of gas that make up the contractual obligations of interstate pipelines for sale to direct consumers and to gas utilities for resale. These requirements are determined from an historical base period, usually between 1968 and 1973 and are adjusted each year for load growth.

FIRM SERVICE. Services from schedules or contracts under which the seller is expressly obligated to deliver specific volumes within a given time period and which anticipates no interruptions, but which may permit unexpected interruption in case the supply to higher priority customers is threatened. (FPC)

FLARING. The burning of natural gas for the purpose of safe disposal.

FLASH BACK. The burning of gas in the mixing chamber of a burner, or in a piping system, usually due to an excess of primary air or too low a velocity of the combustible mixtures through the burner port.

FLASH DISTILLATION. Distillation in which an appreciable proportion of a liquid is quickly converted to vapor in such a way that the final vapor is in equilibrium with the final liquid.

FLASH POINT. The temperature at which a liquid gives off a vapor sufficient to form an ignitable mixture with the air near the surface of the liquid.

FORMALDEHYDE (HCHO). A readily polymerizable gas that has a strong, pungent odor and is soluble in water and alcohol, derived from the oxidation of synthetic methanol or low-boiling petroleum gases, such as propane and butane. It is used in making resins; ethylene glycol; fertilizers; dyes, medicine (disinfectant, germicide); embalming fluids; preservatives; hardening agent; reducing agents.

FRACTION. Any portion of a mixture characterized by closely similar properties. The most important fractions of petroleum are naphtha, gasoline, fuel oil, kerosene, and tarry or waxy residues. These are obtained by fractional distillation.

FRACTIONAL DISTILLATION. Distillation in which rectification is used to obtain a product as nearly pure as possible. A part of the vapor is condensed and the resulting liquid contacted with more vapor, usually in a column with plates or packing.

FRACTURING, HYDRAULIC. A method of inducing flow in oil wells by injecting water or brine under pressure into the oil-bearing strata. The viscosity of the water is often increased by adding gelling agents such as guar gum, cellulose derivatives, or polyacrylamides.

FUEL OIL. Any liquid petroleum product burned in a furnace for the generation of heat, or used in an engine for the generation of power, except oils having a flash point below 100°F. and oils burned in cotton or woolwick burners. The oil may be a distilated fraction of petroleum, a residuum from a refinery operation, a crude petroleum, or a blend of two or more of these. Because fuel oils are used with burners of various types and capacities, different grades are required. (See also NO. 1 DIESEL FUEL; NO. 1 HEATING OIL; NO. 2 DIESEL FUEL; NO. 2 HEATING OIL; NO. 4 DIESEL FUEL; NO. 4 HEATING OIL; BUNKER FUELS; DISTILLATE FUEL OIL; GAS, LIQUEFIED PETROLEUM; OIL, GAS; MIDDLE DISTILLATE; OIL, HEAVY; OIL, LIGHT; and RESIDUAL FUEL OILS.)

FURNACE BLACK. See CARBON BLACK.

GALLON. A unit of liquid measure. The U.S. gallon contains 231 cubic inches or 8.3359 pounds avoirdupois of distilled water at its maximum density and with the barometer at 30 inches.

GAS, CASINGHEAD. A very volatile gas extracted from the "wet" natural gas accompanying oil as it comes from the well. The chief components are the low-boiling liquid hydrocarbons, such as pentane and hexane, together with smaller amounts of lower- and higher-boiling components.

GAS, FLUE. The gases from the fire (before the draft hood or draft regulator) or the products of combustion and excess air consisting principally of carbon dioxide, carbon monoxide, and nitrogen.

GAS HYDRATE. A clathrate compound, crystalline solids insoluble in water, formed by a gas and water. The best known gas hydrates are those of ethane, ethylene, propane, and isobutane.

GAS, LIQUEFIED PETROLEUM (LPG). A colorless, noncorrosive, nontoxic, compressed or liquefied hydrocarbon gas obtained as a by-product in petroleum refining or natural gasoline manufacturing. LPG usually consists of pure propane or a 50-50 mixture of propane and butane containing both normal and isobutanes. It is used as a domestic and industrial fuel; automotive fuel; welding, brazing, and metal cutting.

GAS, MANUFACTURED. A gas obtained by destructive distillation of coal, or by the thermo decomposition of oil, or by the reaction of steam passing through a bed of heated coal or coke. Examples are COAL GAS or coke oven gases, PRODUCER GAS, BLAST FURNACE GAS, "blue" WATER GAS, CARBURETED WATER GAS. The Btu content varies widely.

GAS, MIXED. See MIXED GAS.

GAS, NATURAL. A naturally occurring mixture of the low molecular weight paraffin series hydrocarbons METHANE, ETHANE, PROPANE, and BUTANE, with small amounts of higher hydrocarbons, and frequently small or large proportions of nitrogen, carbon dioxide, hydrogen sulfide, and, occasionally, small proportions of helium. Methane is almost always the major constituent. The exact composition of natural gas varies with the locals. Its heating value is usually over 1000 Btu per cubic foot, unless nitrogen or carbon dioxide are important components of the gas.

ASSOCIATED. Free natural gas in immediate contact with, but not in solution with, crude oil in the reservoir.

DISSOLVED. Natural gas in solution in crude oil in the reservoir.

DRY. (1) Gas whose water content has been reduced by a dehydration process. (2) Gas containing little or no hydrocarbons commercially recoverable as a liquid product. (3) Gas containing a very high proportion of lignter hydrocarbons is also referred to as "dry" gas, e.f., natural gas containing 90 percent or more of methane.

LIQUEFIED NATURAL GAS (LNG). Natural gas cooled and compressed to −259°F, so it forms a liquid at approximately atmospheric pressure. As natural gas becomes liquid it reduces volume nearly 600 fold, thus allowing both economical storage and long distance transportation economically feasible. Natural gas in its liquid state must be regasified and introduced to the consumer at the same pressure as other natural gas. The cooling process does not alter the gas chemically and the regasified LNG is indistinguishable from other natural gases of the same composition.

LIQUID HYDROCARBONS. Mixtures that are gaseous at reservoir temperatures and pressures, but are recoverable by condensation or absorption. Natural gasoline and liquefied petroleum gases fall in this category.

NON-ASSOCIATED. Free natural gas not in contact with, nor dissolved in, crude oil in the reservoir.

SOUR. Gas found in its natural state, containing such amounts of compounds of sulfur as to make it impractical to use, without purifying, because of its corrosive effect on piping and equipment.

SWEET. Gas found in its natural state, containig such small amounts of sulfur compounds that it can be used without purifying or "sweetening," with no deleterious effect on piping and equipment.

WET. Unprocessed natural gas or partially processed natural gas, containing a comparatively high proportion of heavier gases and gas liquids. The term is subject to varying legal definitions as specified by certain State statutes.

GAS OIL. A liquid petroleum distillate with viscosity and boiling range between kerosene and lubricating oil. It is used in absorption oil; the manufacture of ethylene; and the production of OIL GAS.

GAS, OIL. See OIL GAS.

GAS PROCESSING PLANT. A facility that recovers ethane, propane, butane, and other natural gas products by a process of absorption, adsorption, compression, refrigeration cycling, or a combination of such processes, from mixtures of hydrocarbons that existed in a reservoir. (FEA)

GAS, SENDOUT. See SENDOUT GAS.

GAS STATION. A location at which gas changes ownership, from one party to another, neither of whom is the ultimate consumer. Also referred to as a city gate station, town border station.

GAS, SUBSTITUTE NATURAL (SNG). The conversion of other gases, liquids, or solid hydrocarbons to a gaseous fuel of calorific value, heat content, compatibility, and quality equivalent in performance to that of domestic natural gas.

GAS, SUPPLEMENTAL. Gas from sources other than flowing or stored natural gas delivered by interstate pipelines. These sources include imported liquefied natural gas (LNG), synthetic natural gas, derived from liquid hydrocarbons, substitute natural gas (SNG), and propane-air mixture injected into the gas utility delivery system.

GAS, SYNTHETIC NATURAL. See SYNTHETIC NATURAL GAS PLANT.

GAS TRANSPORTED FOR OTHERS. That volume of gas owned by another company received into and transported through any part of the transmission system under a transportation tariff.

GAS, VENT. Products of combustion from gas appliances plus excess air plus dilution air in the gas vent or chimney above the draft hood or draft regulator.

GAS, WOOD. Gas produced during the production of charcoal by heating wood in the absence of air, usually used as a fuel at the production site.

GASIFICATION. Any of several methods for producing hydrocarbon gases from bituminous coal or lignite in commercial quantities.

GASOLINE. A hydrocarbon fuel produced by cracking or breaking down the larger, heavier, and more complex hydrocarbon molecules in petroleum into simpler and lighter molecules.

GATHERING STATION. A place where gas is gathered from underground gas storage or a producing natural gas field and inserted into the pipeline transmission system for distribution.

HEAT, LATENT. Change in heat content of a substance when its physical state is changed without a change in temperature.

HEATING VALUE. The amount of heat produced by complete combustion of a unit quantity of fuel.

HOLDER, GAS. A gas-tight receptacle or container in which gas is stored for future use.

HYDROCARBON. An organic compound containing only elements of hydrogen and carbon. The simplest and lightest forms of hydrocarbon are gaseous, those of greater molecular weight are liquids, and those of even greater weight are solids. Hydrocarbons are derived principally from petroleum, coal tar, and vegetable sources.

HYDROCARBON, LIQUID. A gas liquid that is one of a group of hydrocarbon products derived from natural gas or petroleum (ethane, propane, iso- and normal butane, and natural gasoline.) Light hydrocarbons are produced largely in southwest Texas and Louisiana and are used as feedstocks for a variety of organics. (See also GAS, LIQUEFIED PETROLEUM.)

HYDROFINING. A petroleum refining process in which a limited amount of hydrogenation converts the sulfur and nitrogen in a petroleum fraction to forms in which they can be easily removed. Desulfurization, ultrafining, and catfining have a similar meaning.

HYDROFORMING. The use of hydrogen in the presence of heat, pressure, and catalysts (usually platinum) to convert petroleum hydrocarbons to molecular structures giving high-octane gasoline for automobiles and airplanes.

HYDROGEN. The lightest chemical element which as a gas is very slightly soluble in water, alcohol, and ether, which is nontoxic and noncorrosive. It is used in producing synthetic ammonia and synthetic methanol; refining petroleum; hydrogenation of organic materials; a reducing agent for organic synthesis and metallic ores; as oxyhydrogen flame for high temperatures; atomic-hydrogen welding; making hydrochloric and hydrobromic acids; and the production of high purity metals.

HYDROGENATION. The chemical combination of hydrogen with another substance, usually as unsaturated organic compound, by means of heat, pressure, and catalysts. It is widely used in the edible oil and petroleum industries.

ILLUMINANTS. Hydrocarbons other than methane present in carbureted water gas and similar gases. It includes mainly thylene and the lower olefin and aromatic hydrocarbons, as well as ethane and higher paraffin hydrocarbons, and usually any acetylene, diolefins, or other hydrocarbons soluble in fuming sulfuric acid as used in absorption gas-analysis procedures.

IMPORTER. Any firm (excluding the Department of Defense) that owns at the first place of storage any allocated product or crude oil brought into the United States. (FEA)

INDEPENDENT. In the oil industry, usually refers to a nonintegrated producing company. The independent producer has operations only in the field of petroleum production, as a rule.

INDUSTRIAL USE. Usage by those firms primarily engaged in a process which creates or changes raw or unfinished materials into another form or product. (See also CLASS OF SERVICE.)

INTEGRATED COMPANY. A company which obtains a significant portion of its gas operating revenues from the operations of both a retail gas distribution system and gas transmission system. An integrated company usually operates production, transportation, refining, and marketing facilities.

INTERRUPTIBLE CUSTOMERS. Those purchasers receiving an allocated product pursuant to a contract that can be abrogated unilaterally by the supplier.

INTERRUPTIBLE NATURAL GAS. Volumes of gas sold to some ultimate customers under a contract that allows the supplier to cut off the supply whenever the demand of the non-interruptible customers exceeds a certain value (usually as a result of severe cold weather).

ISOPENTANE ($(CH_3)_2CHCH_2CH_3$). A colorless, highly flammable, pleasant smelling liquid, soluble in hydrocarbons, oils and ether, but not in water. Isopentane, produced by FRACTIONAL DISTILLATION from petroleum and purified by rectification, is used in solvents; the manufacture of chlorinated derivatives; and as a blowing agent for polystyrene.

LICENSEE. Any person, or State, licensed under the provisions of the Federal Power Act and subject to the commission's accounting requirements under the terms of the license. (FPC)

LINE PACK, GAS DELIVERED FROM. That volume of gas delivered to the markets, supplied by the net change in pressure in the regular system of mains, transmission, and/or distribution. For example, the change in the content of a pipeline brought about by the deviation from steady flow condition.

LIQUEFIED NATURAL GAS (LNG). See GAS, NATURAL.

LIQUEFIED PETROLEUM GAS (LPG). See GAS, LIQUEFIED PETROLEUM.

LIQUIDS, NATURAL. See NATURAL GAS.

LOAD. The amount of gas delivered or required at any specified point or points on a system; load originates primarily at the gas consuming equipment of the customers. Also, to load a governor is to set the governor to maintain a given pressure as the rate of gas flow through the governor varies.

LOAD FACTOR. The ratio of the average requirement to the maximum requirement for the same time period, as one day, or one hour.

LP GAS—AIR MIXTURE. Liquefied petroleum gases distributed at relatively low pressures and normal atmospheric temperatures which have been diluted with air to produce desired heating value and utilization characteristics.

MERCHANT STORAGE FACILITY. Any facility utilized to store propane for firms other than the owner or operator of such a facility.

METER RATES. See RATES, METER.

METHANE (CH_4). The first member of the paraffin series of hydrocarbons (also known as "marsh gas" and methyl hydryde); a colorless, odorless, tasteless, and flammable gas. Pure methane has a heating value of 1010 Btu per cubic foot and liquefies at —259°F. It is the lightest and the chief constituent of natural gas and of marsh gas; a major component of coal gas; and is present to some extent in coal mines.

Methane is used as a source of petrochemicals by conversion to hydrogen and carbon monoxide by steam cracking or partial oxidation.

Important products are methanol, acetylene, hydrogen cyanide. Chlorination gives carbon tetrachloride, chloroform, methylene chloride, and methyl chloride. In the form of natural gas, methane is used as a fuel and is also a source of carban black.

METHANOL (CH_3OH). A clear, colorless, volatile, flammable, poisonous liquid (also known as methyl alcohol and "wood alcohol"), soluble in water, alcohol, and ether. It is produced from (1) high pressure catalytic synthesis from carbon monoxide and hydrogen, or from carbon dioxide and hydrogen; (2) partial oxidation of natural gas hydrocarbons; and (3) purification of the pyroligneous acid resulting from the destructive distillation of wood. Methanol is used in organic synthesis; automobile antifreeze; formaldehyde production; denaturing ethyl alcohol; general solvents, paint removers and varnishes; polishing and cleaning preparations; a dehydrator for natural gas; and fuel compositions used for heating and illumination.

MIDDLE DISTILLATE. Any derivatives of petroleum, including kerosene; home heating oil, range oil, stove oil, and diesel fuel, with a 50 percent boiling point in the ASTM D86 standard distillation test falling between 371° and 700°F. Products specifically excluded from this definition are kerosene-base and naphtha-base jet fuel, heavy fuel oils as defined in VV-F-815C or ASTM D-396, grades #4, 5, and 6, intermediate fuel oils (which are blends containing #6 oil), and all specialty items such as solvents, lubricants, waxes, and process oil.

MINIMUM BILL CLAUSE (MINIMUM CHARGE). A clause in a rate schedule that provides that the charge for a prescribed period shall not be less than a specified amount.

MIXED GAS. A gas in which manufactured gas is commingled with natural or liquefied petroleum gas (except where the natural or liquefied petroleum gas is used only for enriching or reforming) in such a manner that the resulting product has a Btu value higher than that previously produced by the utility prior to the time of the introduction of natural or liquefied petroleum gas.

NAPHTHA. (1) A flammable, volatile, oily liquid produced by fractional distillation of petroleum, used as a source (by various cracking processes) of gasoline, special naphtha, petroleum chemicals, especially ethylene (the latter in turn producing propylene, butadiene, pyrolysis gasoline, and fuel oil). (2) Any of several flammable, volatile liquids produced by distillation of coal tar, wood, coal, and other carbonaceous materials.

NATURAL GAS. See GAS, NATURAL.

NATURAL GAS ACT OF 1938. A Federal law giving the Federal Power Commission jurisdiction over companies engaged in interstate sale or transportation of natural gas.

NATURAL GAS LIQUIDS. See GAS, NATURAL.

NATURAL GASOLINE. See GASOLINE, NATURAL.

NEOPENTANE (C_5H_{12}) or ($C(CH_3)_4$). A hydrocarbon present in small amounts in natural gas. It can take the form of either a colorless gas or a very volatile liquid which is soluble in alcohol but not in water. Neopentane is used in research and butyl rubber.

NEW GAS. Gas being made available for the first time by a contract of purchase and sale.

NON-ASSOCIATED NATURAL GAS. See GAS, NATURAL.

NONBRANDED INDEPENDENT MARKETER. A firm engaged in the marketing or distribution of refined petroleum products, who is (1) not a refiner, (2) not a firm that controls, is controlled by, is under common control with, or is affiliated with a rener (other than by means of a supply contract), and (3) not a branded independent marketer. (FEA)

NO. 1 DIESEL FUEL. Diesel fuel grade No. 1 as defined in the American Society for Testing and Materials (ASTM) D975-71.

NO. 1. HEATING OIL. Heating oil grade No. 1 as defined in the American Society for Testing and Materials (ASTM) D396-71.

NO. 2 DIESEL FUEL. Diesel fuel grade No. 2 as defined in the American Society for Testing and Materials (ASTM) D975-71.

NO. 2 HEATING OIL. Heating oil grade No. 2 as defined in the American Society for Testing and Materials (ASTM) D396-71.

NO. 4 DIESEL FUEL. Diesel fuel grade No. 4 as defined in the American Society for Testing and Materials (ASTM D975-71.

NO. 4 HEATING OIL. Heating oil grade No. 4 as defined in the American Society for Testing and Materials (ASTM) D396-71.

NONFIRM GAS. Gas that is not required to be delivered nor required to be taken under the terms of a gas purchase contract.

ODORANT. A substance with a distinctive, sometimes unpleasant, odor deliberately added to essentially odorless materials to provide warning of their presence. For example, mercaptan derivitives may be added to natural gas for this purpose.

OFF-PEAK SERVICE. Service made available on special schedules or contracts on a firm basis but only for a specified part of the year during the off-peak season.

OIL BLACK. A carbon black made from oil, usually an aromatic-type petroleum oil. (See also CARBON BLACK.)

OIL GAS. A gas, composed mainly of volatile hydrocarbons and hydrogen, resulting from the thermal decomposition of petroleum oils ranging from naphtha to heavy residuum high-carbon oils.

OIL, GAS. See GAS OIL.

OIL, HEAVY. Heavy, thick, and viscous, usually refinery residuals commonly specified as grades 5, 6, and Bunker C.

OIL, LIGHT. A fractional distillate, generally including all oils lighter than residual fuel oils No. 5 and No. 6. Light oils are used as a source of benzene, solvent napthas, toluene phenol, and cresols.

OLD GAS. Gas already made available by an existing purchase and sale contract.

ORDER. A written directive or verbal communication of a written directive, if promptly confirmed in writing, issued by the FEA or a State Office. A notice of probable violation is not an order (see REMEDIAL ORDER). For purposes of this definition, a "written directive" shall include telegrams, telecopies, and similar transcriptions.

ORIGINAL COST. As applied to a gas plant, the cost of such property to the person first devoting it to public service.

OVERRUN, AUTHORIZED. Gas authorized to be taken above contract demand volume.

PAD DISTRICT or DISTRICT. Any of the Petroleum Administration for Defense (PAD) Districts. (FEA)

PARAFFINS (PARAFFIN HYDROCARBONS) (C_nH_{2n+2}). The group of aliphatic hydrocarbon compounds characterized by a straight carbon chain, varying with increasing molecular weight from colorless gases (methane) through water-white liquid to waxy, low-melting point, solids. They occur principally in Pennsylvania and Midcontinent petroleum.

PARAFFIN DISTILLATE. A distilled petroleum fraction, which, when cooled, consists of a mixture of crystalline wax and oil.

PEAK DAY. The 24-hour period of greatest gas send-out.

PEAK SHAVING. The use of fuels and equipment to generate or manufacture gas to supplement the normal pipeline gas supply during periods of extremely high demand.

PENTANE ($CH_3(CH_2)_3CH_3$). A colorless, mobile, flammable liquid, soluble in hydrocarbons, oils, and ether, not in water. It is produced by fractional distillation from petroleum and purified by rectification. As one of the heavier, more highly condensed, hydrocarbons, it is already liquid at atmospheric pressure and has a higher boiling point than the lighter hydrocarbons, i.e., methane, ethane, propane, and butane. Pentane is used in anesthetics; artificial-ice making; low temperature thermometers; and in solvents.

PETROCHEMICALS. Chemical compounds for which petroleum or natural gas has served as the ultimate raw material. For example, the cracking of petroleum produces ethylene, which, in turn, converts to ethylene glycol, a typical petrochemical. The term is applied also to chemicals produced from other sources as well as from petroleum. (Ammonia is referred to as a petrochemical, because the hydrogen used to form the ammonia is a product of petroleum refining. Thus synthetic fertilizers are considered to be petrochemicals. Another example is butadiene, which is made from a variety of other sources as well as petroleum.) At least 175 substances are designated as petrochemicals including many paraffins, olefin, napthene, and aromatic hydrocarbons (methane, propane, ethylene, propylene, butanes, cyclohexane, benzene, toluene, napthalene, etc.) and their derivatives, even though some of their commercial production is from sources other than petroleum.

PETROCHEMICAL FEEDSTOCK USE. Use of crude oil, residual fuel oil, and refined petroleum products for processing in a petrochemical plant. (FEA)

PETROCHEMICAL INDUSTRY. Those areas of manufacturing that use raw materials extracted wholely or largely from petroleum or natural gas.

PETROCHEMICAL PLANTS. Those industrial plants, regardless of capacity, that process petrochemical feedstocks and obtain at least 30 percent conversion, by weight, to petrochemicals or other products that are converted to other petrochemicals, so long as the weight of hydrocarbon contained in the final petrochemical is equal to at least 30 percent of the initial petrochemical feedstock fed to the plant under consideration. (FEA)

PETROCHEMICAL PRODUCER. One who manufactures petrochemicals in a petrochemical plant by processing petrochemical feedstock. (FEA)

PETROLEUM. A highly complex mixture of various hydrocarbons, paraffin, napthane, and aromatic hydrocarbons, containing small amounts of organic sulfur and very small amounts of nitrogen and oxygen compounds, which exists as a thick, heavy, flammable, dark-brown, unpleasant-smelling liquid in the upper strata of the earth. The terms "paraffin base crude," "naphtha" or "asphalt base crude," and "aromatic base crude" indicate the most prevalent constituents of crudes from various locales. (For example, in general, Pennsylvania crudes are aliphatic, wax base; Far Western crudes are aromatic, asphalt base; and Mid-Continent crudes mixed-base.) The most important petroleum fractions, obtained by cracking or distillation, are naphtha of various grades, gasoline, kerosene, fuel oils, gas oil, lubricating oils, and paraffin wax, asphalt, road oil, and coke; it is the source of literally thousands of organic compounds. Petroleum is distributed throughout the world, chiefly in the U.S. (including Alaska); Canada; Australia; Western USSR (Baku); the Middle East; North Africa; and Venezuela. (See also FUEL OIL.)

PETROLEUM GAS, LIQUEFIED. See GAS, LIQUEFIED PETROLEUM.

PLANT PROTECTION FUEL. The use of propane in the minimum volume required to prevent physical harm to the plant facilities or danger to plant personnel. This includes the protection of such material and equipment that would otherwise be damaged, but does not include sufficient quantities of propane required to maintain plant production. Propane may not be considered plant protection fuel if an alternate fuel is available and technically feasible for substitution. (FEA)

PRESSURE, ABSOLUTE (PSIA). Pressure above that of a perfect vacuum. It is the sum of gauge pressure and atmospheric pressure.

PRIMARY AIR. Air that is mixed with fuel before the mix reaches the ignition zone to enhance combustion.

PRIME SUPPLIER. The supplier or producer who makes the first sale of any allocated product subject to the State set-aside into the State distribution system for consumption within the state.

PRIORITIES-OF-SERVICE CATEGORIES. For a discussion of the FPC's curtailment of service priorities, see 18 CFR, 2.78.

PROBABLE RESERVES. In mining industries other than petroleum the amount of reserves estimated to be available once additional development expenditures are incurred.

PROCESSING GAS. Natural gas use for which alternate fuels are not technically feasible, such as in applications requiring precise temperature controls and precise flame characteristics. For the purposes of this definition, propane and other gaseous fuels shall not be considered alternate fuels. (See also DIRECT FLAME PROCESS GAS.) (FPC)

PRODUCER. A firm or that part of a firm which produces crude petroleum or natural gas, or any firm owning crude petroleum or natural gas when it is produced.

PRODUCER GAS. A gas manufactured by blowing or blasting humidified air on a deep bed of ignited solid fuel, usually coal or cake. This regulated deficiency of air results in a gas with a large percentage of nitrogen (approximately 55 percent), which has a low heating value. (See also SYNTHESIS GAS and WATER GAS.)

PRODUCER-PURCHASER. A producer who purchases or obtains fuel from another producer.

PRODUCER-SUPPLIER. Producer who supplies fuel to another producer.

PROPANE (C_3H_8). A colorless, noncorrosive, nontoxic, highly flammable hydrocarbon gas, which has a natural gas odor, is soluble in ether and alcohol, but only slightly soluble in water, and is derived from petroleum and natural gas. It is used in organic synthesis; household and industrial fuel; manufacture of ethylene; extractant; solvent; refrigerant, gas enrichment; aerosol propellant; mixture for bubble chambers.

PROPANE, BOTTLED. For FEA definition see BOTTLED PROPANE.

PROPANE-BUTANE MIX. A mix containing 10 percent or more by weight of propane.

RATE BASE. The value established by a regulatory authority, upon which a utility is permitted to earn a specified rate of return.

RATES, METER. The term is applicable to any method of charge for gas service based solely upon quantity, such as Mcf or therms used.

BLOCK. Indicates that a certain specified price per unit is charged for all or any part of a block of such units, and reduced prices per unit are charged for all or any part of succeeding blocks of such units, each such reduced price per unit applying only to a particular block or portion thereof.

STEP. Indicates that a certain specified price per unit is charged for the entire consumption, the rate or price depending on the particular step within which the total consumption falls.

STRAIGHT-LINE (FLAT). Indicates that the prices charged per unit is constant, i.e., does not vary on account of an increase or decrease in the number of units.

RECYCLING. The repetition of a particular process; the return of a stream or part of a stream to a previous process or location for additional recovery of the desired components.

REFINED PETROLEUM PRODUCT. Gasoline, kerosene, middle distillate (including No. 2 fuel oil), LPG, refined lubricating oils, or diesel fuel. (FEA)

REFINERIES. Those industrial plants, regardless of capacity, processing crude oil feedstock and manufacturing refined petroleum products, except when such plant is a petrochemical plant. (FEA)

REFINERY GAS. A mixture of hydrocarbon gases (often together with some sulful compounds) produced in large-scale cracking and distilling crude oil and its heavy derivatives during refinery operations and used as a source of raw material for petrochemicals, high octane gasoline, and organic synthesis of alcohols.

REFINING. Essentially a separation process whereby undesirable components are removed from various types of mixtures to give a concentrated and purified product. It includes not only fractional distillation of crude oil to naphtha, low-octane gasoline, kerosene, fuel oil, and asphaltic residues, but also the processes involved in thermal and catalytic cracking (*hydroforming, reforming, etc.*) for production of high-octane gasoline. (See also HYDROFINING.

REFORMED GAS. Although applicable to any gas transformed by suitable treatment, the term is ordinarily applied to lower thermal value gases obtained by the pyrolysis and steam decomposition of high thermal value gases, such as natural gas or oil refinery gas. The steam minimizes carbon loss and possesses other advantages. Carbureted water gas apparatus is often used for reforming natural gas and oil gas.

REFORMING. A chemical process using heat to break down a substance into desired components.

REGULATOR, PRESSURE. A device that maintains the pressure in a fluid flow line, less than its inlet pressure within a constant band of pressure, regardless of the rate of flow in the line or the change in upstream pressure.

REMEDIAL ORDER. A directive issued by FEA requiring a person to cease a violation or to eliminate or to compensate for the effects of a violation, or both. (FEA)

REPRESSURING. Forcing gas, under pressure, into the oil reservoir in an attempt to increase the recovery of crude oil; also done with water.

RESELLER. A firm (other than a refiner or retailer) or that part of such a firm which carries on the trade or business of purchasing covered products, and reselling them without substantially changing their form to purchasers other than ultimate consumers.

RESERVES, ENERGY. The bank of natural resources, such as natural gas, natural gas liquide, petroleum, coal, lignite, and energy available from water power.

ESTIMATED POSSIBLE NATURAL GAS RESERVES. An estimate of the ultimate finding of natural gas in a specified area, whether or not presently considered proved or recoverable.

ESTIMATED PROVED RECOVERABLE NATURAL GAS RESERVES. An estimate of natural gas producible from tested reservoirs under present technology, including gas in underground storage reservoics and gas in those undrilled portions of proven fields where its producibility is considered assured by the known field geology.

RESIDENTIAL USE. Direct usage in a residential dwelling or church or other place of worship for space heating, refrigeration, cooking, water heating, and ther residential uses. (See also CLASS OF SERVICE: RESIDENTIAL SERVICE.) (FEA)

RESIDUAL FUEL OILS. Liquid (or, in some cases, semi-liquid) products obtained as residues from the distillation of petroleum as distinguished from *distillate fuel oils*. They contain the asphaltic hydrocarbons. Residual oils are also known as asphaltum oil, liquid asphalt, black oil, flux oil, petroleum tailings, and residuum. For allocation purposes FEA classifies the following fuel oils as "residual fuel oils": (1) No. 4, No. 5, and No. 6 fuel oils; (2) Bunker C; and (3) Navy Special Fuel Oil; crude oil, when burned directly as a fuel; and all other fuel oils that have a 50 percent boiling point over 700°F in the ASTM D-86 standard distillation test. (See also BY-PRODUCTS.)

RESIDUALS. See BY-PRODUCTS (RESIDUALS).

RESINOL. A coal-tar distillation fraction containing phenols. It is the fraction soluble in benzene but insoluble in light petroleum, obtained by solvent extraction of low temperature tars or similar materials.

RULING. An official interpretive statement of general applicability issued by the FEA General Counsel and published in the *Federal Register* that applied the FEA regulations to a specific set of circumstances.

SANITATION SERVICES. The collection and disposal for the general public of solid wastes, whether by public or private entities, and the maintenance, operation, and repair of liquid purification and waste facilities during emergency conditions. Sanitation services also include the provision of water supply services by public utilties, whether privately or publicly owned or operated. (FEA)

SATURATION, APPLIANCE OR CUSTOMER. The number of specified appliances, or users, divided by the basic units or total potential of the universe involved, i.e., Gas Heating Saturation related to customers in the total number of customers with space heating divided by the total number of customers.

SCRUBBING. Process for removing one or more components (usually impurities) from a mixture of gases and vapors by its passage upward and usually countercurrent to and in intimate contact with a stream of descending liquid, the latter being chosen so as to dissolve the desired components and not others. The gas or vapor may be broken into fine bubbles upon entering a tower filled with liquid, but more frequently the tower is filled with coke, broken stone or other packing, over which the liquid flows while exposing a relatively large surface to the rising gas or vapor.

SEASONAL GAS. Gas sold during certain periods of the year. It may be sold either on a firm or an interruptible basis.

SECONDARY AIR. The air for combustion externally supplied to the flame at the point of combustion.

SECONDARY PRODUCTION OR RECOVERY. Oil and gas obtained by the augmentation of reservoir energy; often by the injection of air, gas, or water into a production formation.

SENDOUT GAS. Total gas produced, purchased (including exchange gas receipts), or net withdrawn from underground storage within a specified time interval, measured at the point(s) of production and/or purchase, and/or withdrawal, adjusted for changes in local storage quantity. It comprises gas, exchange, deliveries, gas used by company and unaccounted-for gas.

SENDOUT, MAXIMUM DAY. The greatest actual sendout occurring in a specified 24-hour period.

SENDOUT, MINIMUM DAY. The smallest actual total sendout occurring in a specified 24-hour period.

SERVICE AREA. Territory in which a utility system is required or has the right to supply gas service to ultimate customers.

SERVICE LIFE. The time between the date the gas plant is in service or leased to others and the date of its retirement. If depreciation is accounted for on a production basis rather than on a time basis, then service life should be measured in terms of the appropriate unit of production. (FPC)

SERVICE VALUE. The difference between original cost and net salvage value of a gas plant. (FPC)

SHORTFALL. The actual deficiency in the supply of natural gas resulting from a curtailment. The shortfall is computed from the current actual demand by the end-users and includes, beyond the conventional deliveries by interstate pipelines, the available supplemental supplies in natural gas and the utilization of alternate fuels. Thus the shortfall will in general be smaller than the administratively determined curtailment.

SHRINKAGE, NATURAL GAS. The reduction in volume of wet natural gas due to the extraction of some of its constituents, such as hydrocarbon products, hydrogen sulfide, carbon dioxide, nitrogen helium, and water vapor.

SOUR NATURAL GAS. See GAS, NATURAL.

SPECIAL PRODUCTS. Gasoline, No. 2 heating oil, and No. 2-D diesel fuel. (FEA)

STATE OFFICE. A State Office of Petroleum Allocation certified by the FEA. (FEA)

STATE SET-ASIDE. With respect to a particular prime supplier, the amount of an allocated product made available from the total supply of a prime supplied pursuant to 10 CFR, 211.17 for utilization by a State to resolve emergencies and hardships due to fuel shortages. The State set-aside amount for a particular month and State is calculated by multiplying the State set-aside percentage level by the prime supplier's estimated portion of its total supply for that month which will be sold into that State's distribution system for consumption within the State. The initial State set-aside percentage level for an allocated product is specified in the appropriate subpart of 10 CFR for that product but is subject to change by notice of the FEA. (FEA)

STORAGE, BURIED PIPE. A system of storage in especially designed high pressure pipe sections or bottles capable of storing natural gas at pressures near or equal to the pressure of maximum supercompressibility. Not storage in ordinary steel pipe.

STORAGE CAPACITY, PREVAILING. The estimated total volume of gas to be contained in an underground storage reservoir which exerts a pressure from 0 gauge gas pressure to the maximumgas pressure anticipated for the present state of development. This includes all gas of the following classifications: Cushion gas, both native (if any) and foreign, recoverable and non-recoverable, and current gas.

STORAGE CAPACITY, ULTIMATE. See STORAGE, UNDERGROUND: ULTIMATE RESERVOIR CAPACITY.

STORAGE, LOCAL. The storage facilities, other than undergroundstorage, that are an integral part of a distribution system, i.e., on the distribution side of the city gate, whether for manufactured, mixed, natural, liquefied petroleum, or liquefied natural gas.

STORAGE MAINS. Those mains used primarily for injection and withdrawal of gas to and from underground storage.

STORAGE, UNDERGROUND. The utilization of subsurface facilities for storing gas that has been transferred from its original location for the primary purposes of load balancing, fuller utilization of pipeline facilities, and more effective and economic delivery to markets. The facilities are usually natural geological reservoirs, such as depleted oil or gas fields or water-bearing sands sealed on the top by an impermeable cap rock. The facilities also may be man-made or natural caverns.

CURRENT GAS. The total volume of gas in a storage reservoir in excess of the cushion gas.

CUSHION GAS. The total volume of gas to maintain the required rate of delivery during an output cycle.

EXTRANEOUS GAS. That volume of gas not indigenous to the storage reservoir.

FOREIGN GAS. Extraneous gas.

NATIVE GAS. The total volume of gas indigenous to the storage reservoir at the time the gas storage started.

NON-CURRENT GAS. That part of the gas in underground storage the cost of which is included in the Utility Plant. This accounting figure may not be the same as Cushion Gas, one reason for the difference being that some of the Cushion Gas may not be capitalized.

STORED GAS. See EXTRANEOUS GAS above.

TOP GAS. See Current Gas above.

TURNOVER GAS. The total volume of stored gas available for delivery from a storage reservoir during one output cycle.

ULTIMATE RESERVOIR CAPACITY. The total estimated volume of gas that could be contained in an underground storage reservoir when it is developed to the maximum pressure permitted by the geological configuration of the reservoir.

WORKING GAS. See CURRENT GAS above.

STRAIGHT GAS UTILITY. A company that derives the major portion of its total operating revenue from gas operations. (See also COMBINATION UTILITY and UTILITY.)

SUBSTITUTE NATURAL GAS (SNG). See GAS, SUBSTITUTE NATURAL (SNG).

SUPPLEMENTAL GAS. See GAS, SUPPLEMENTAL.

SWEET NATURAL GAS. See GAS, NATURAL.

SYNTHESIS GAS. Any mixture of carbon monoxide and hydrogen, usually intended to be used for catalytic conversion to ammonia, hydrocarbons, alcohols, or other compounds. The hydrogen and carbon monoxide may be in various proportions, and production may be by high temperature action of steam on carbon or natural gas, by partial oxidation of natural gas, or by other processes. (See also WATER GAS.)

SYNTHETIC NATURAL GAS PLANT. A facility producing synthetic natural gas which results from the manufacture, conversion, or reforming of petroleum hydrocarbons, and which may be easily substituted for or interchanged with pipeline quality natural gas.

TARIFF. A published volume of rate schedules and general terms and conditions under which a product or service will be supplied.

THERM. A unit of heating value equal to 100,000 British thermal units (Btu).

THERMAL BLACK. See CHANNEL BLACK.

TOTAL SUPPLY. The sum of a supplier's estimated production, including amounts received under processing agreements, imports, purchases, and any reduction in inventory of an allocated product made pursuant to 10 CFR, 211.22 except as otherwise ordered by FEA. Any existing inventory, or production, importation or purchase of an allocated produce used to increase that inventory consistent with the provisions of 211.22 shall not be included in the total supply of that product. (FEA)

TRANSPORTATION SYSTEM. The land, structures, mains, valves, meters, boosters, regulators, tanks, compressors, and their driving units and appurtenances, and other equipment used primarily for transmitting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas, to one or more distribution areas. The transmission system begins at the outlet side of the valve at the connection to the last equipment in a manufacturing gas plant, the connection to gathering lines to delivery point of purchased gas, and includes the equipment at such connection that is used to bring the gas to transmission pressure, and ends at the outlet side of the equipment which meters or regulates the entry of gas into the distribution system or into a storage area. It does not include storage land, structures or equipment. Pipeline companies, including those companies which measure deliveries of gas to their own distribution systems, shall include city gate and main line industrial measuring and regulating stations in the transmission function. (FPC)

UTILITY. A facility that generates electricity, by any means, and sells it to the public (FEA). (See also COMBINATION UTILITY and STRAIGHT GAS UTILITY.)

VENTING. Also referred to as "blowdown." (1) Clearing gas from a pipeline by blowing it into the atmosphere. (2) A pipe or valve used to vent gas to the atmosphere. (3) A procedure whereby gas pressure is reduced intentionally in a section of the line by venting. It is accomplished by the opening of valves and closure fittings provided in each block valve assembly.

WATER GAS. A fuel gas, also known as "blue gas" or "blue water gas," made by decomposing steam by passing it over a bed of incandescent coke, or by high temperature reaction of steam with natural gas or similar hydrocarbons. The term "blue water gas" is used to denote that type of water gas used under certain industrial conditions and as a diluent for peak-load demands on natural gas, oil gas, or coal gas distributing systems. Since this gas is low in heating value (about 300 Btu per cubic foot) and burns with a non-luminous flame, it is enriched for ordinary city gas purposes with oil gas and is then known as CARBURETED WATER GAS.

WELLHEAD. The assembly of fittings, valves, and controls located at the surface and connected to the flow lines, tubing, and casing of the well in order to control the flow from the reservoir.

WET NATURAL GAS. See GAS, NATURAL.

WOOD GAS. See GAS, WOOD.

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